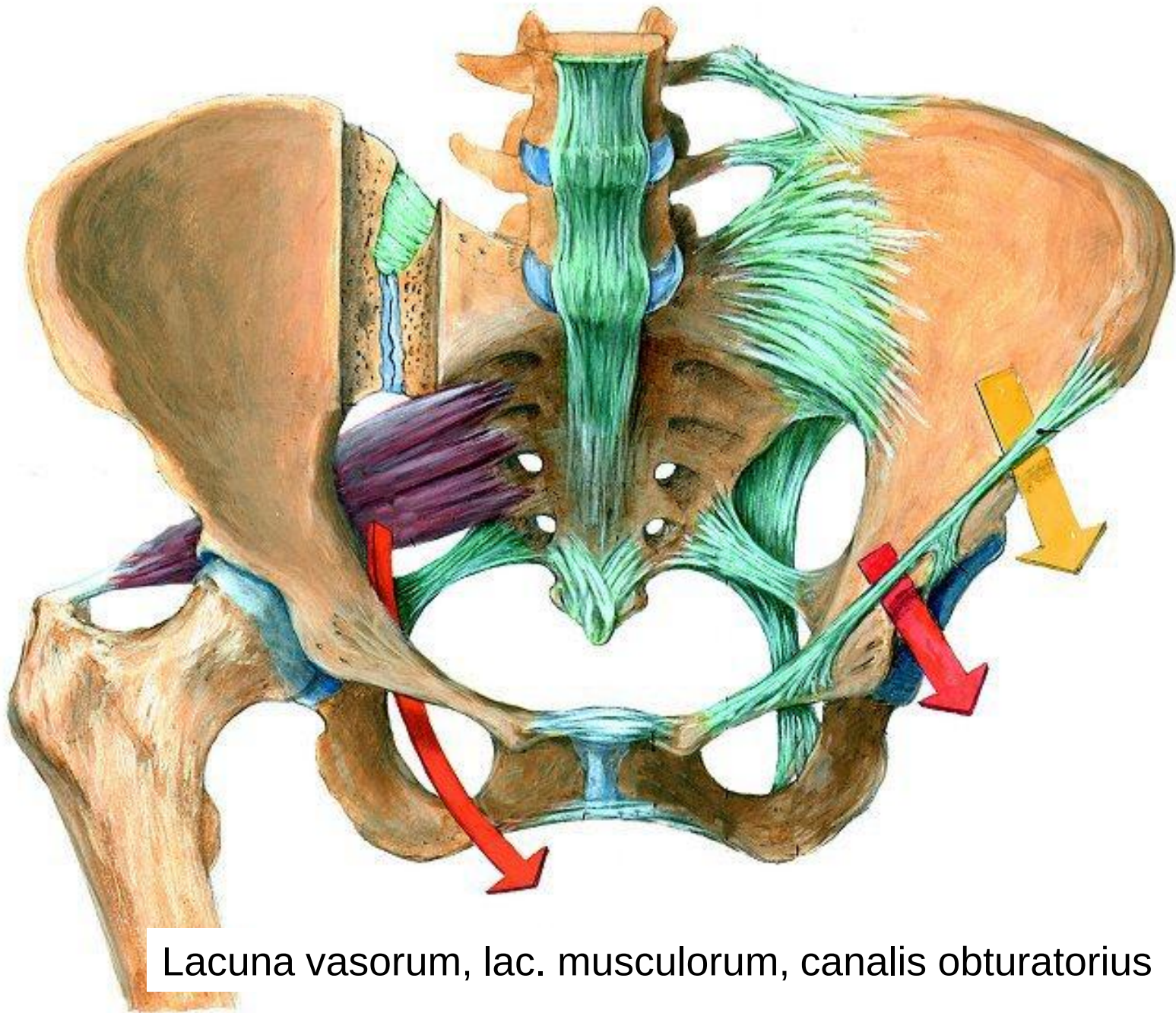


Diaphragma pelvis, diaphragma urogenitale mm. perinei, retroperitoneum



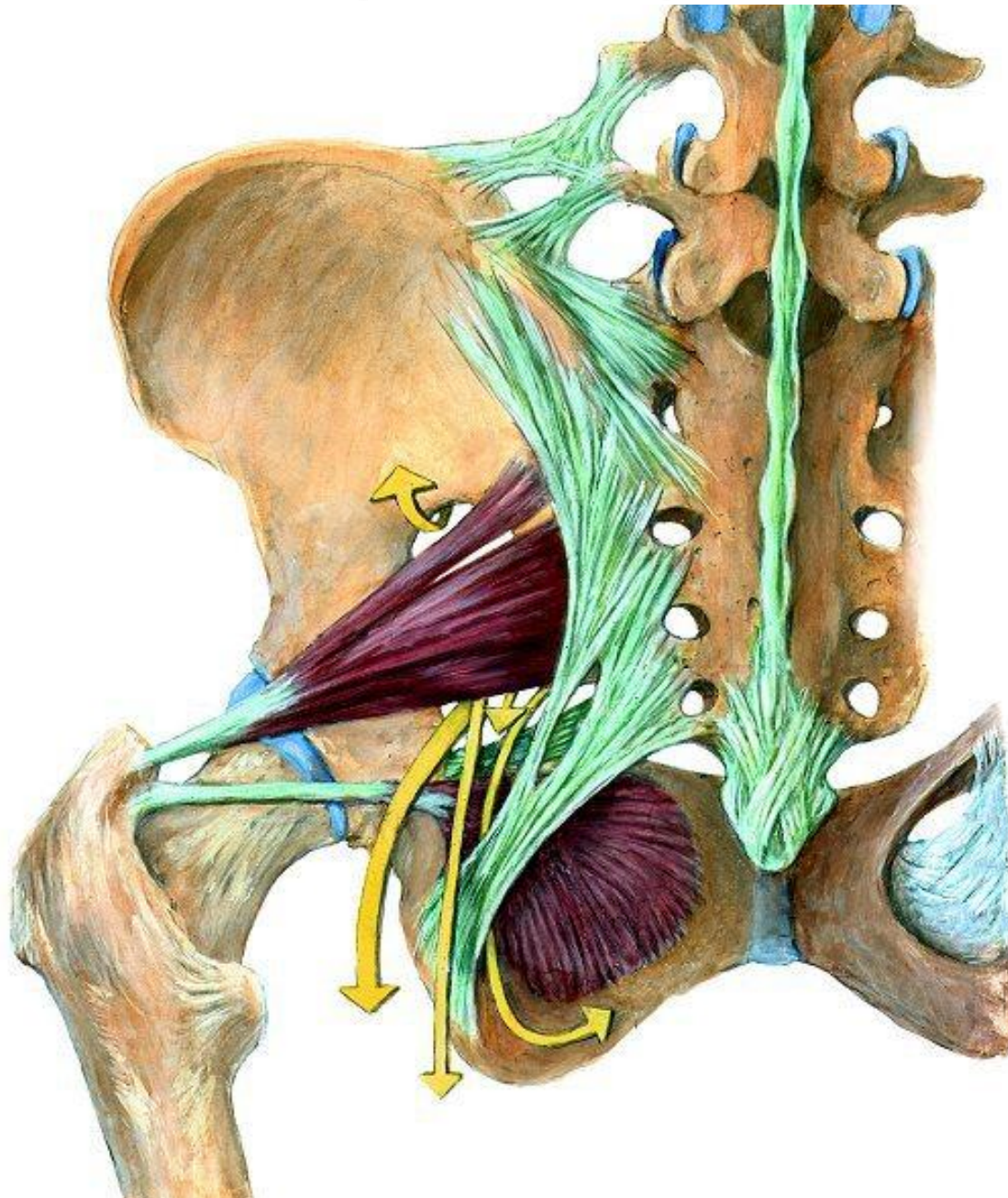
Petr Valášek & Miloš Grim
Anatomický ústav 1. lékařské fakulty
Univerzita Karlova

přednáška pro posluchače všeobecného a zubního lékařství
2021-2022



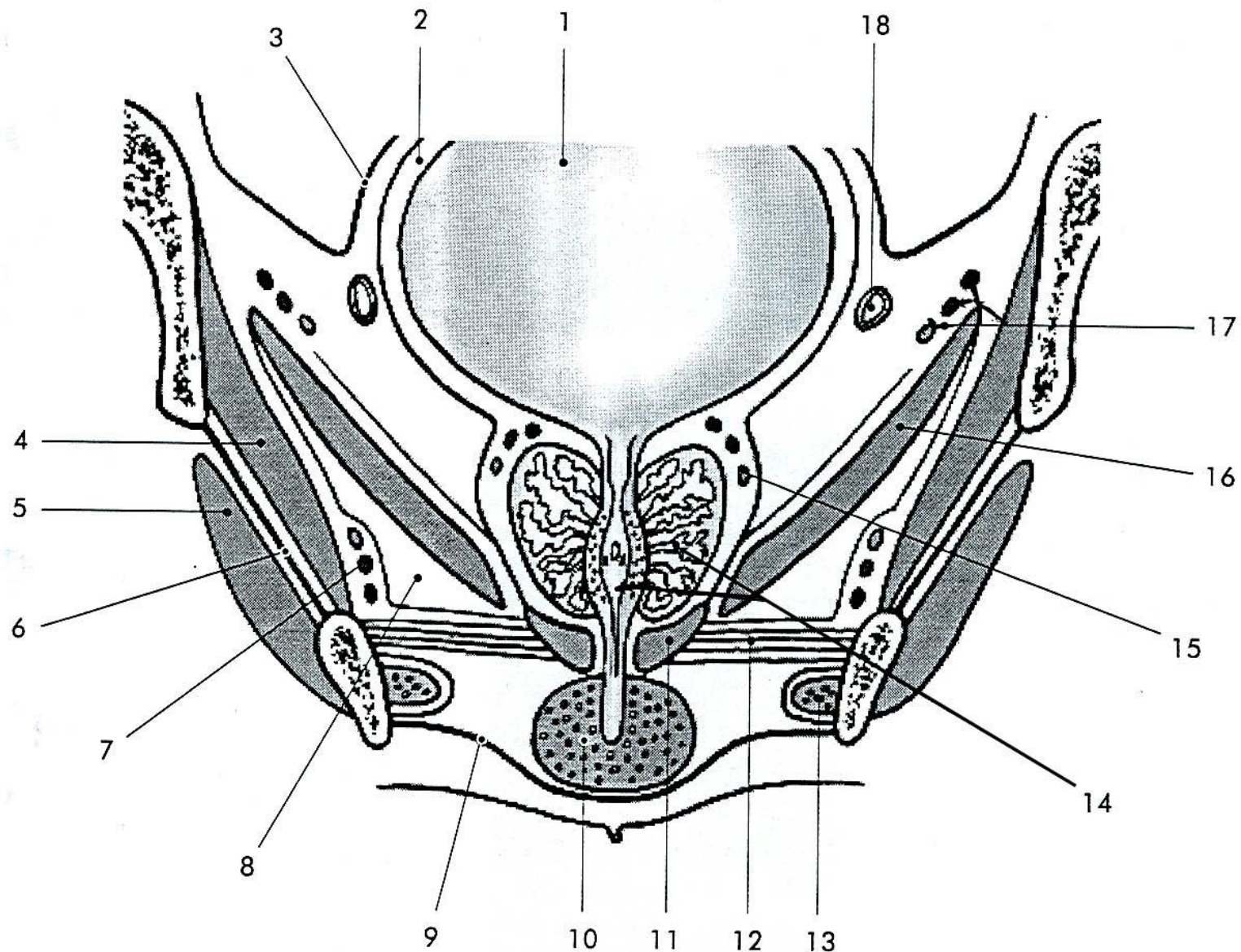
Lacuna vasorum, lac. musculorum, canalis obturatorius

Foramen supra- a infrapiriforme



Pánevní dno

1. Diaphragma pelvis
2. Diaphragma urogenitale
3. Mm. perinei



Obr. 8.34. Frontální řez pánví v úrovni prostaty. 1 – močový měchýř, 2 – paracystium, 3 – peritoneum, 4 – m. obturatorius internus, 5 – m. obturatorius externus, 6 – membrana obturatoria, 7 – Alcockův kanál a v něm vasa pudenda interna a n. pudendus, 8 – fossa ischioanal, 9 – fascia perinei superficialis, 10 – bulbus corporis spongiosi urethrae, 11 – m. sphincter urethrae externus, 12 – diaphragma urogenitale, 13 – crus penis, 14 – prostata a pars prostatica urethrae, 15 – plexus venosus prostaticus, 16 – m. levator ani, 17 – n. a vasa obturatoria, 18 – ductus deferens

Pánevní dno

1. Diaphragma pelvis

levator ani (pubovaginalis/puborectalis) + **coccygeus** sakrální větve

(2. Diaphragma urogenitale)

(transversus perinei superficialis + profundus)

3. Svaly hráze

sphincter ani externus

sphincter urethrae externus

+ urethrovaginal sphincter

+ urethral compressor

ischiocavernosus

bulbospongiosus

arcus tendineus m. l.a.

pelvic fascia

centrum tendineum perinei

Inervace

n. pudendus
(Alcock)

Onufovo jádro
S2 a S3

1. Diaphragma pelvis

Pelvic diaphragm

Pelvic diaphragm

arcus tendineus m. l.a.

fascia pelvis

centrum tendineum perinei

příčně pruhovaná svalovina původem z ocasu inervovaná ze sakrálního plexu

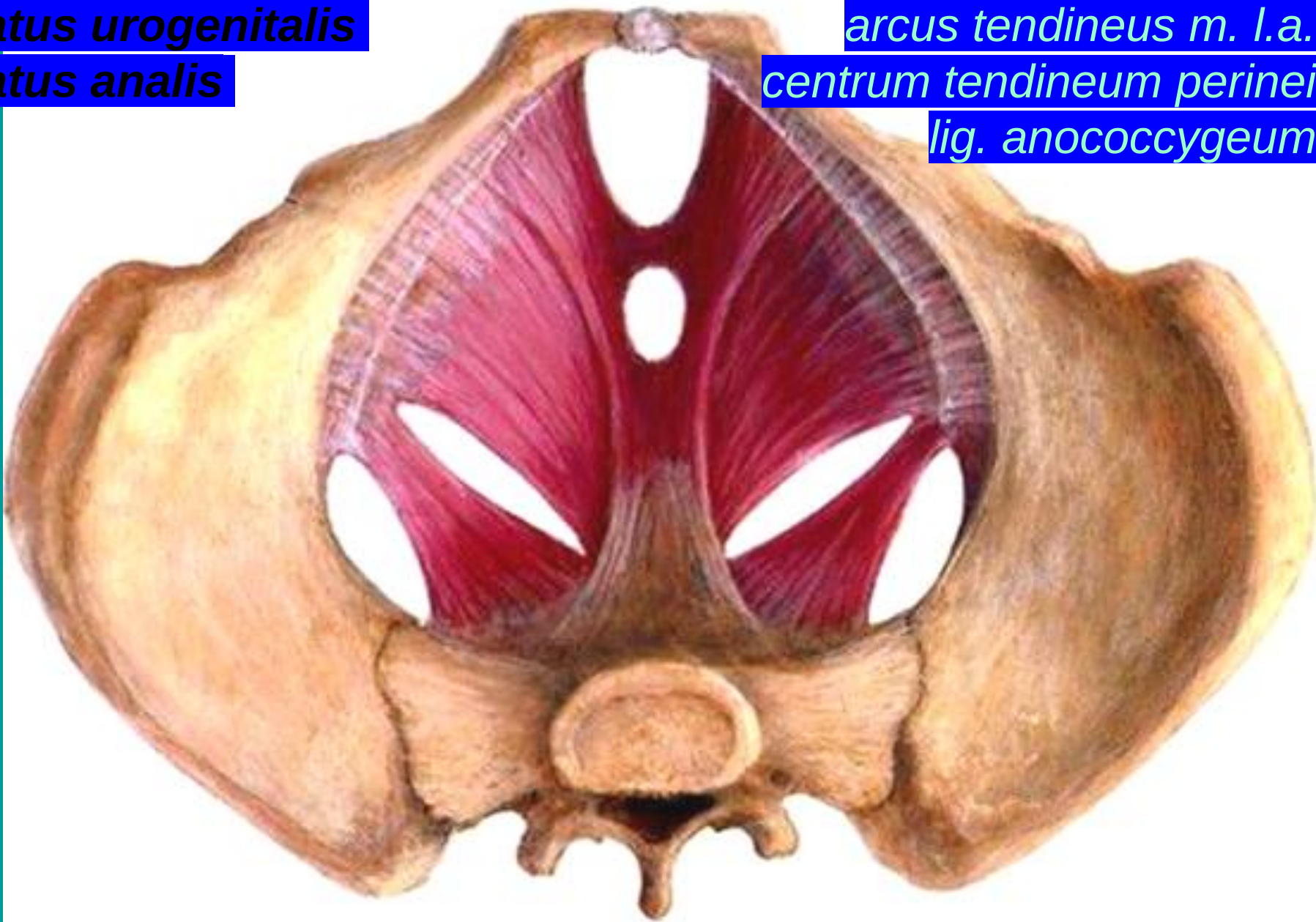
hiatus urogenitalis

hiatus analis

arcus tendineus m. l.a.

centrum tendineum perinei

lig. anococcygeum



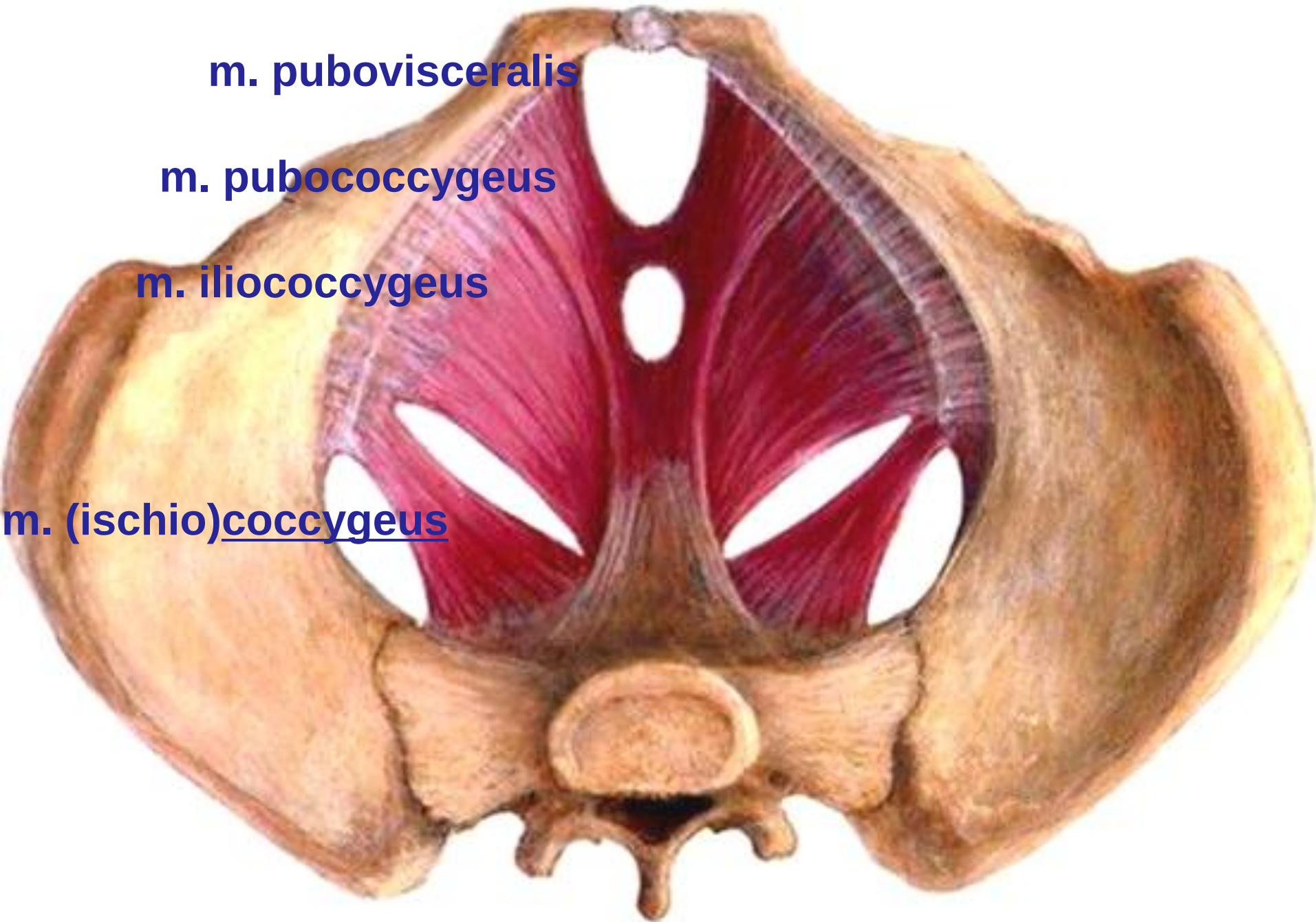
Pelvic diaphragm

m. pubovisceralis

m. pubococcygeus

m. iliococcygeus

m. (ischio)coccygeus



Diaphragma pelvis

M. levator ani

pars publica

- m. pubovisceralis
- m. pubovaginalis
- m. puboprostaticus
- m. puboperinealis
- m. puborectalis
- m. pubococcygeus

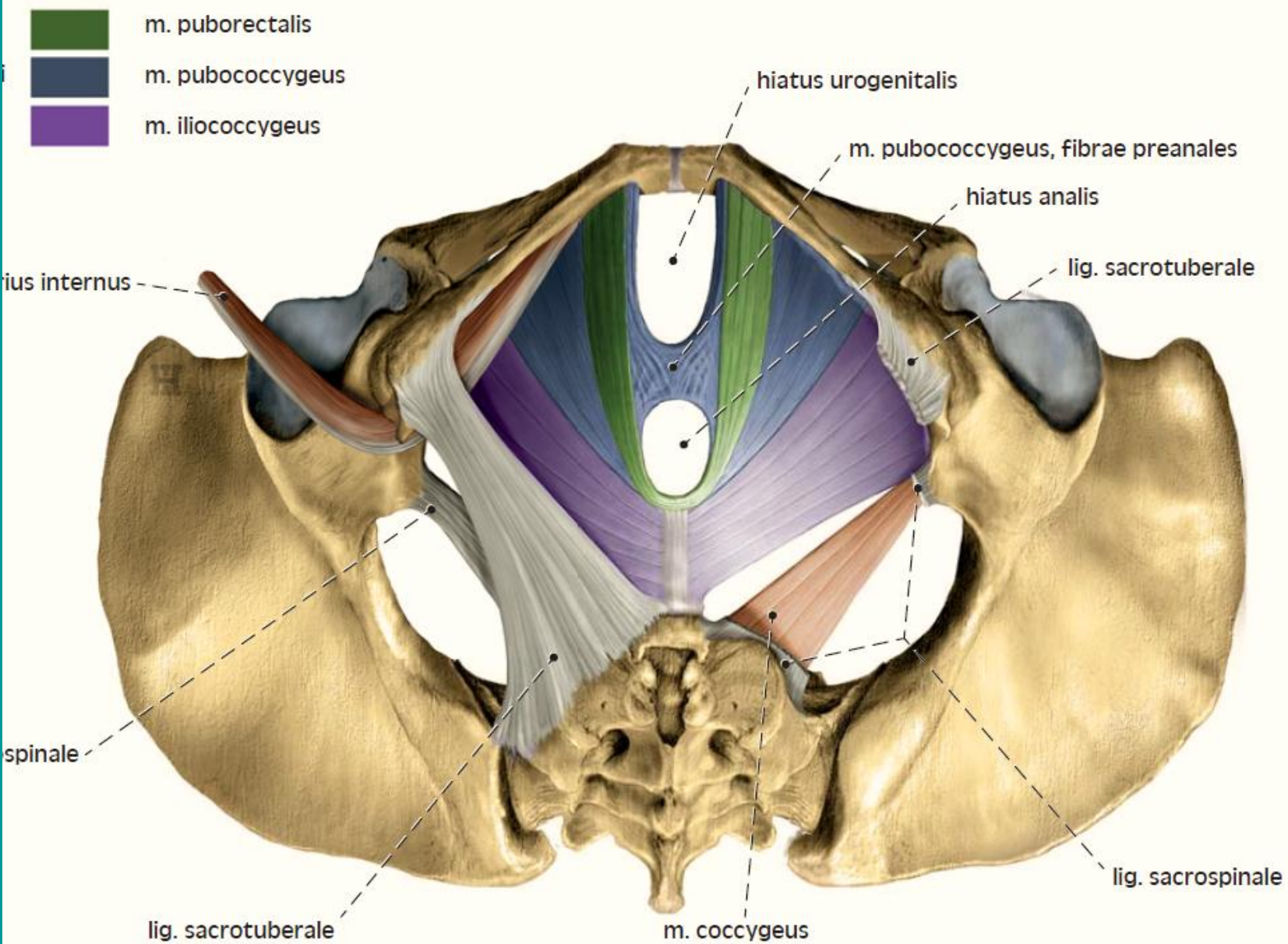
pars iliaca

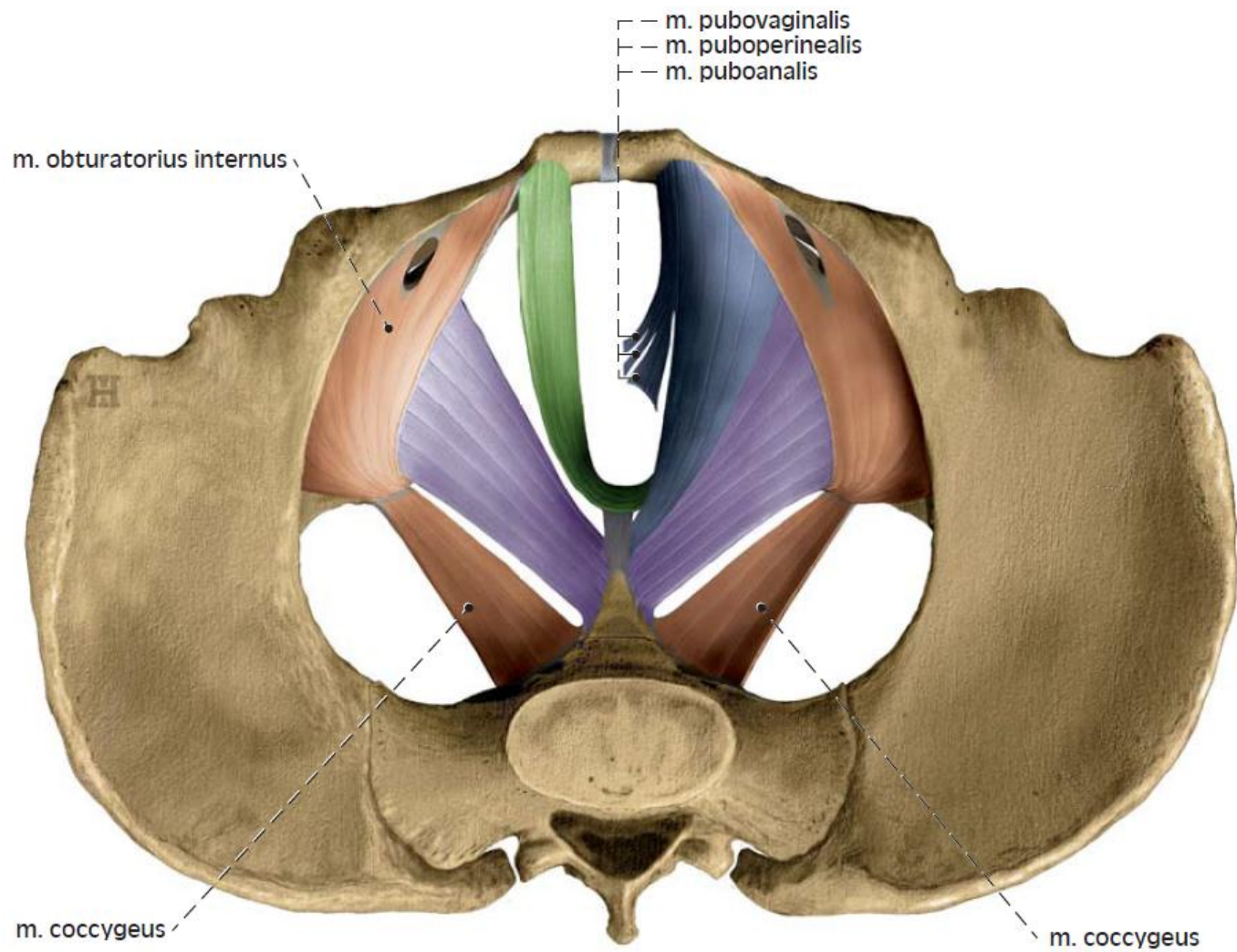
- m. iliococcygeus

M. coccygeus

pars ischiadica

- m. (ischio)coccygeus





m. levator ani

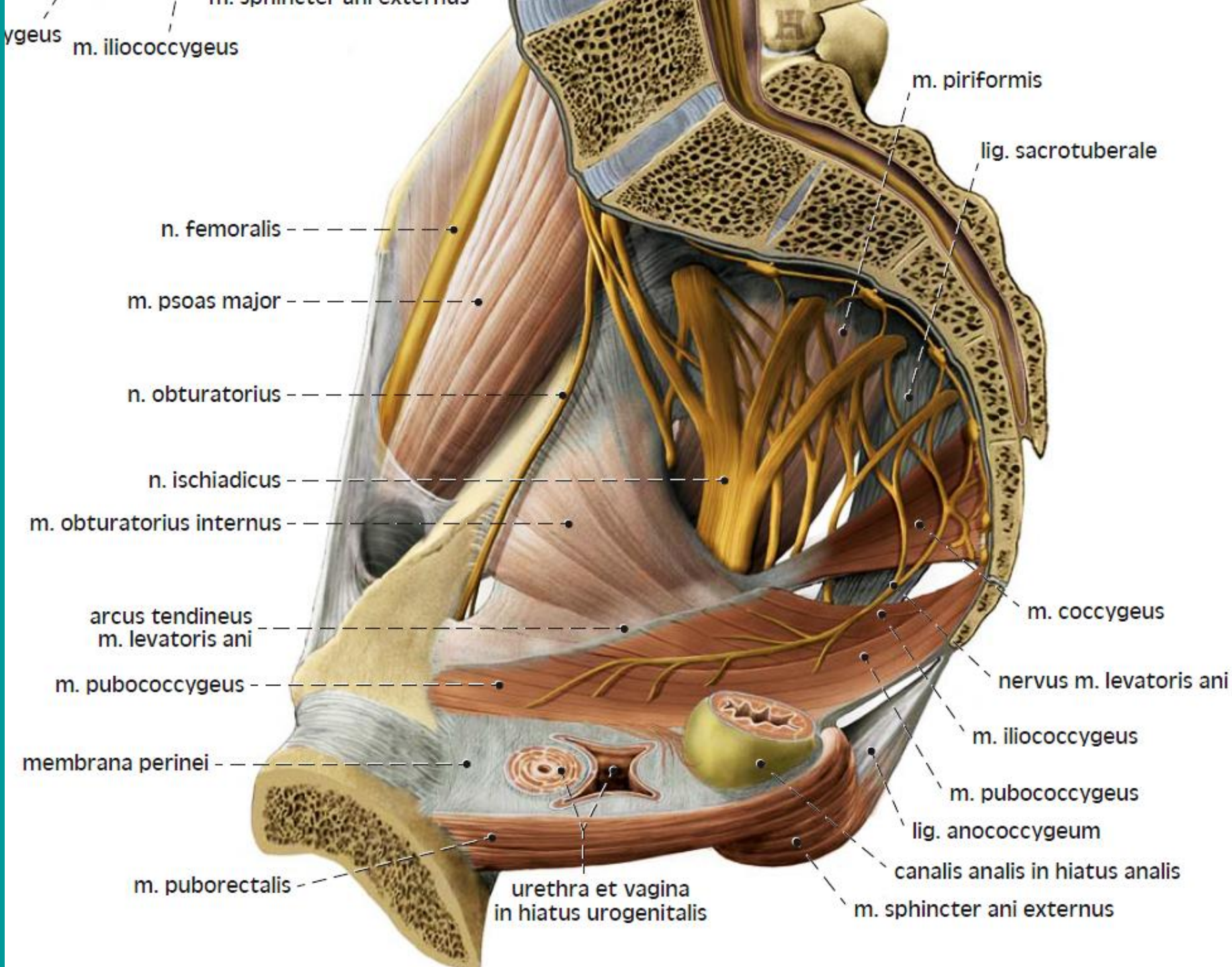


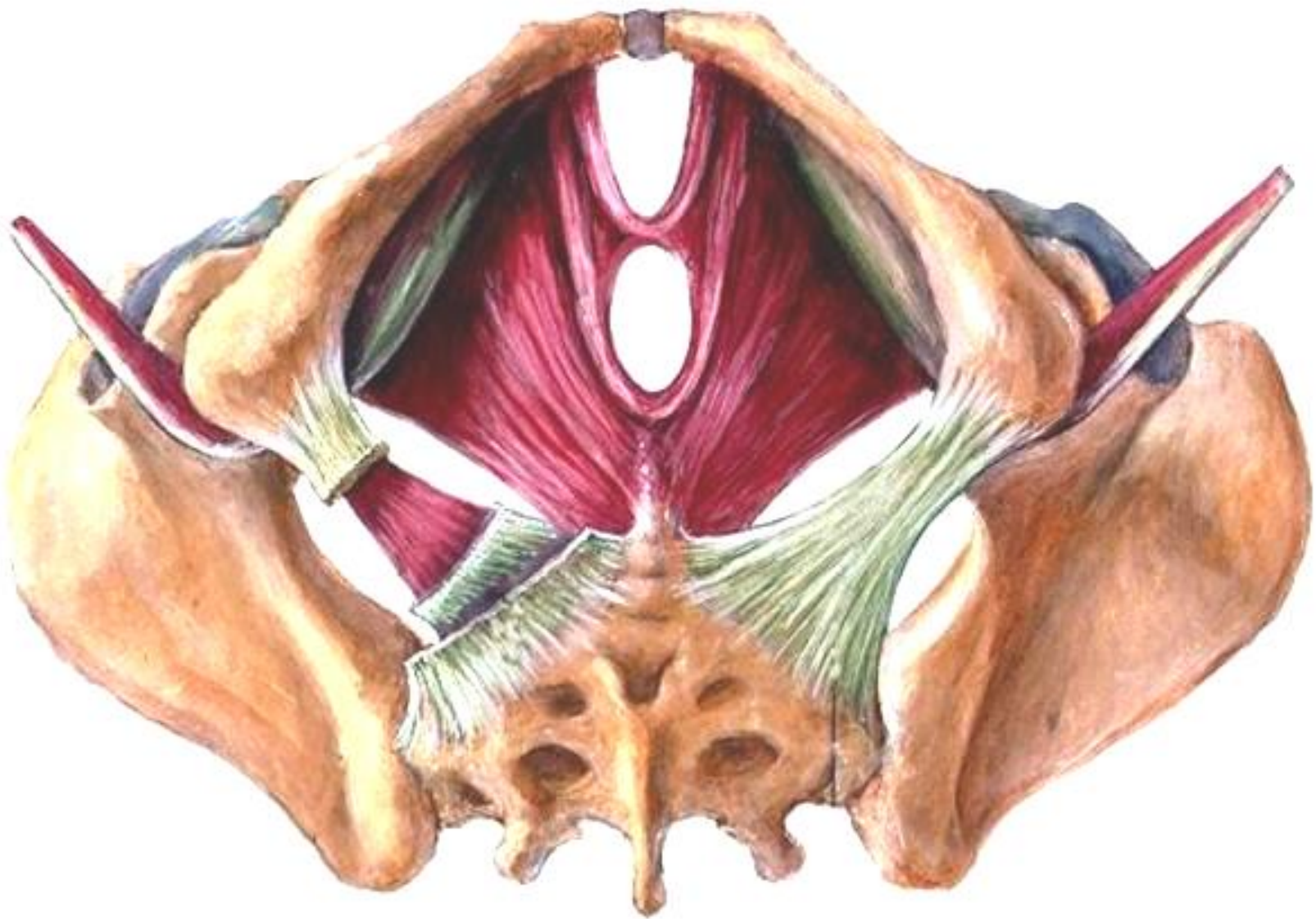
m. puborectalis

m. pubococcygeus

m. iliococcygeus

hiatus urogenitalis





Diaphragma pelvis, pohled z perinea

M. levator ani

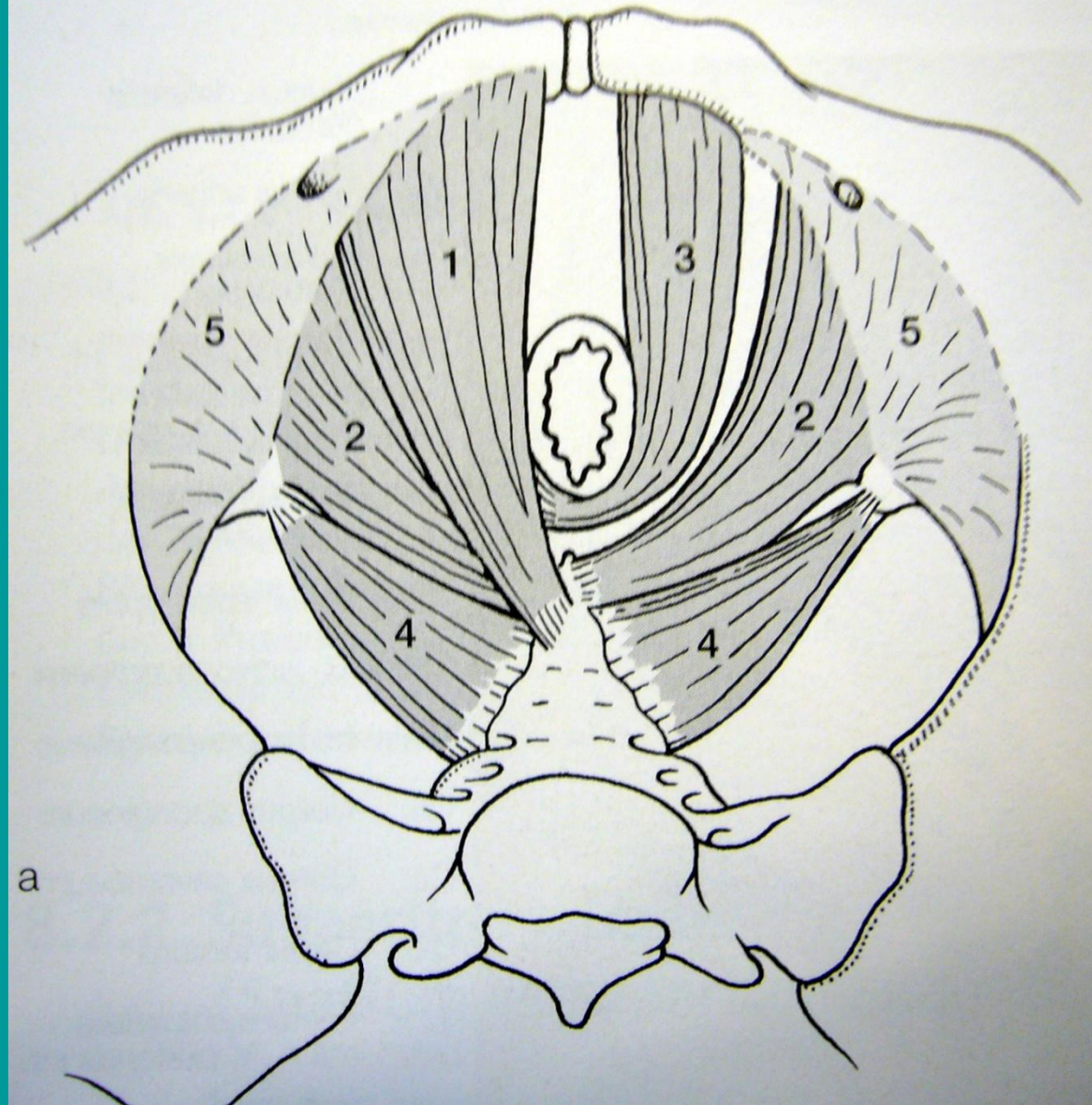
3 - puborectalis

1 – m. pubococcygeus

2 – m. iliococcygeus

4 – m. ischiococcygeus

5 – m. obturatorius int.



Superior view

Pubic symphysis

Ulnal ligament
(upart)

Deep dorsal vein of clitoris

Transverse perineal

Fascia of deep p

Urethra

Va

piriform muscle

Coccyx

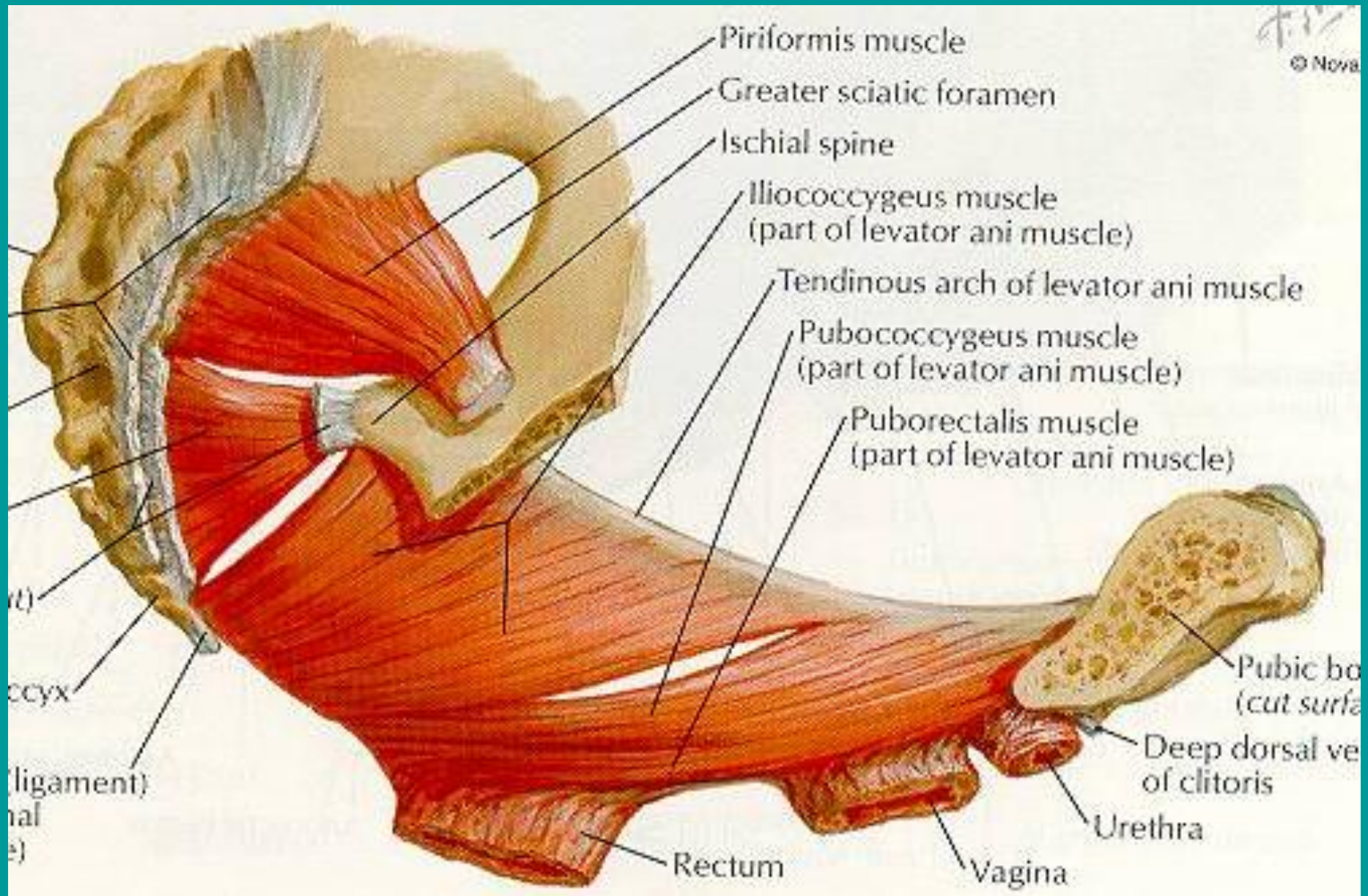
Anterior sacro-
ligament

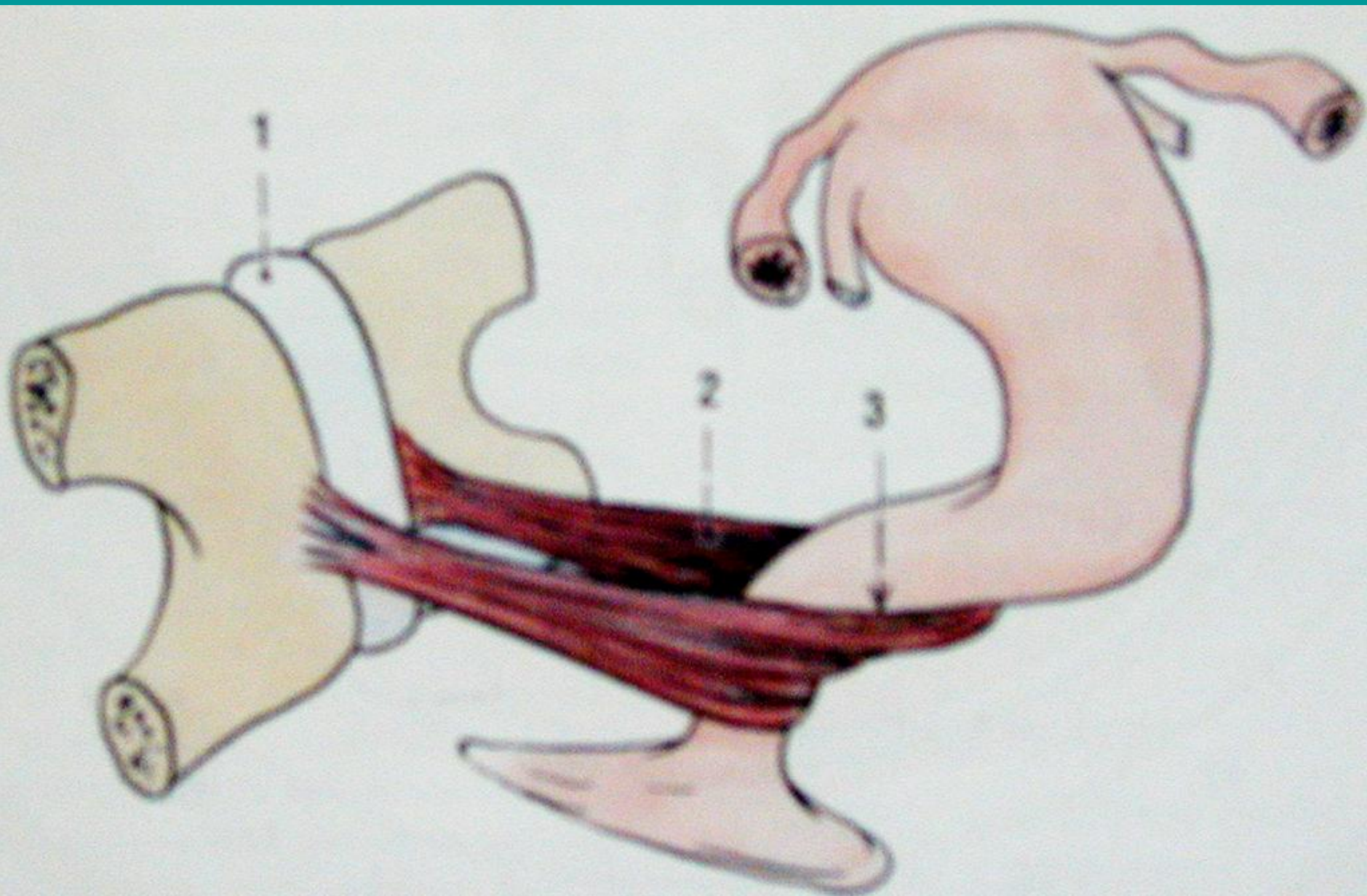
Pelvic diaphragm

Pi

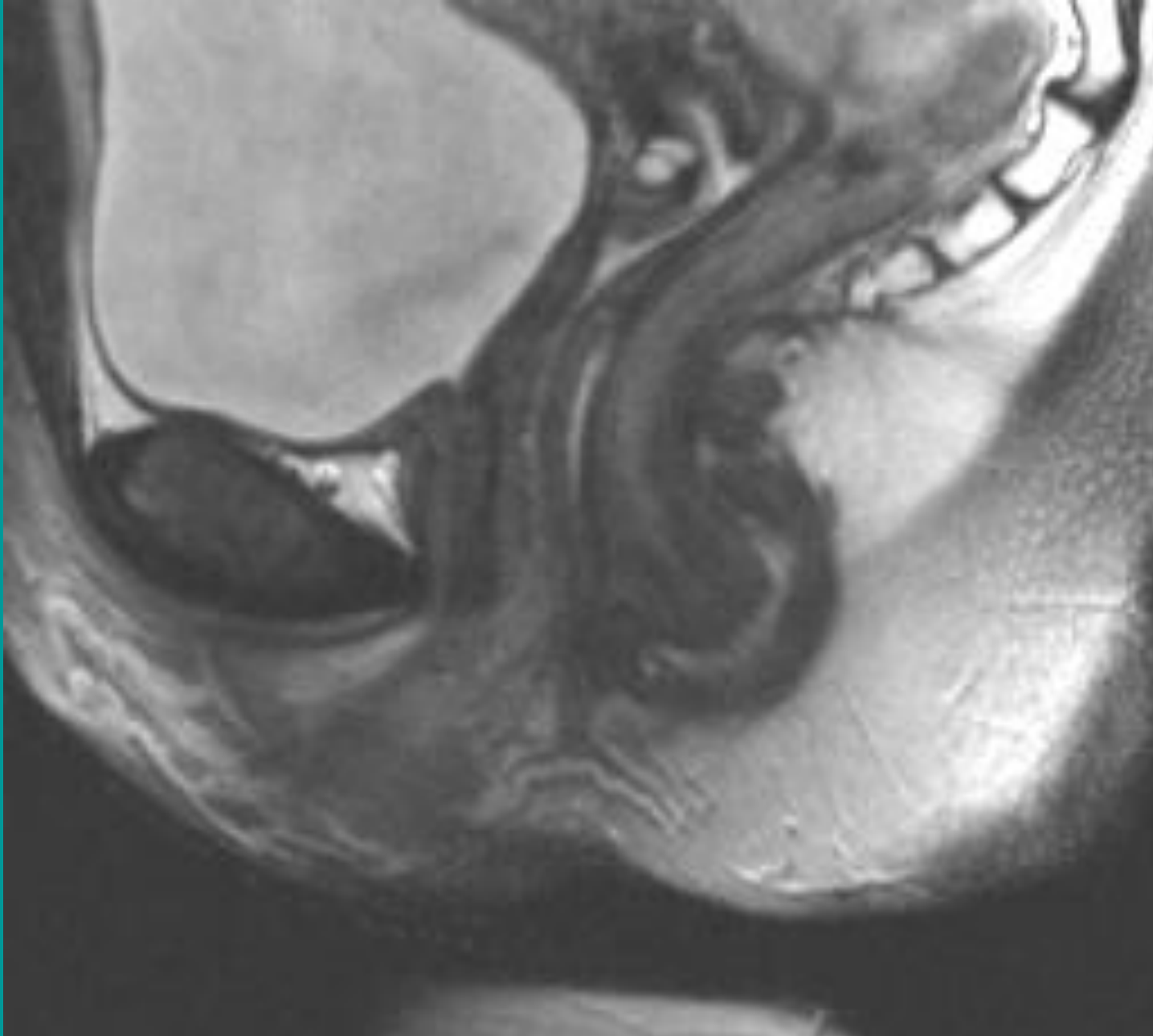


M. levator ani





Klička m. pubovaginalis



MRI ženské pánve sagitálně

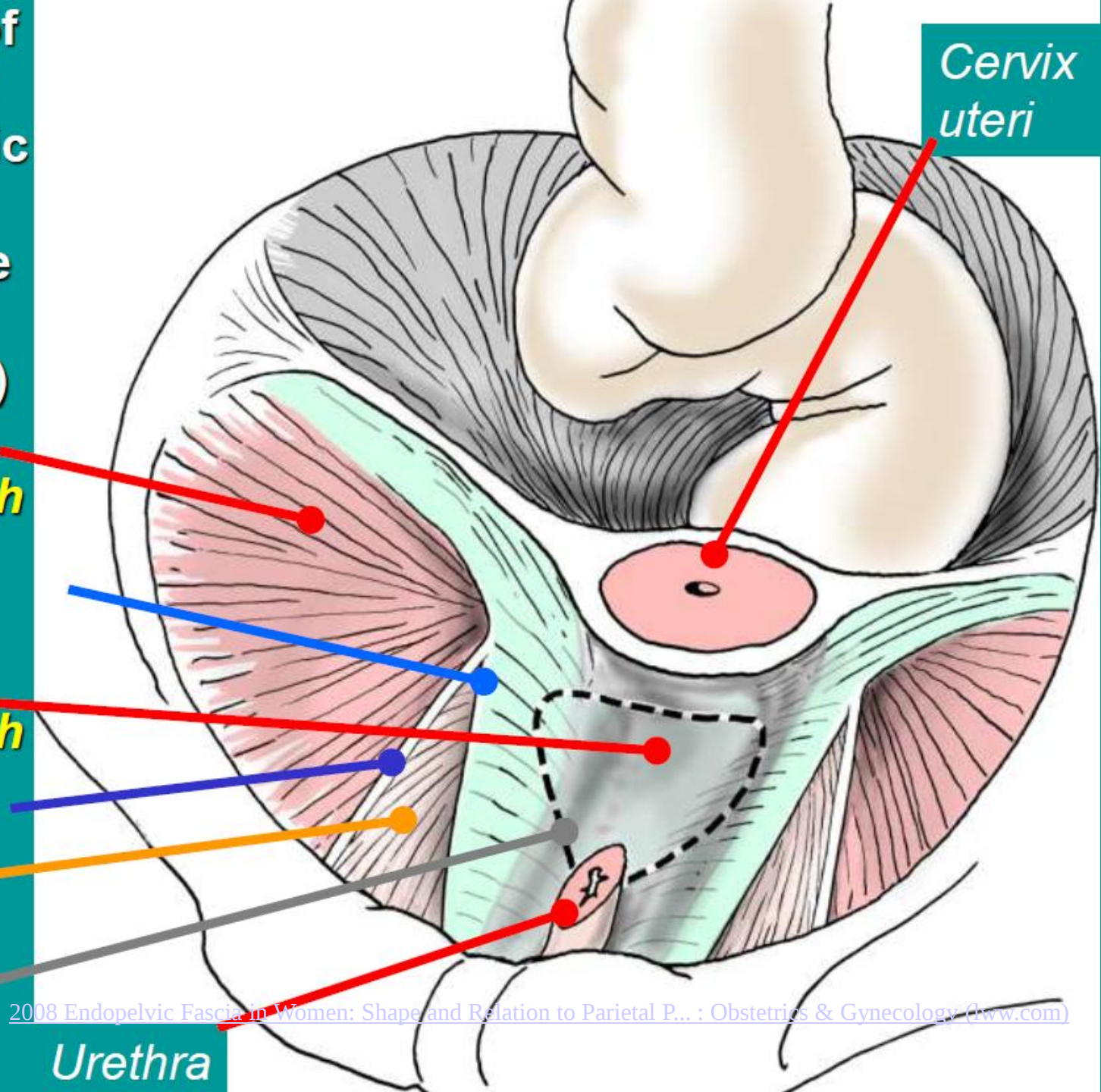
© Švábik, Mašata, Martan, Wymysli

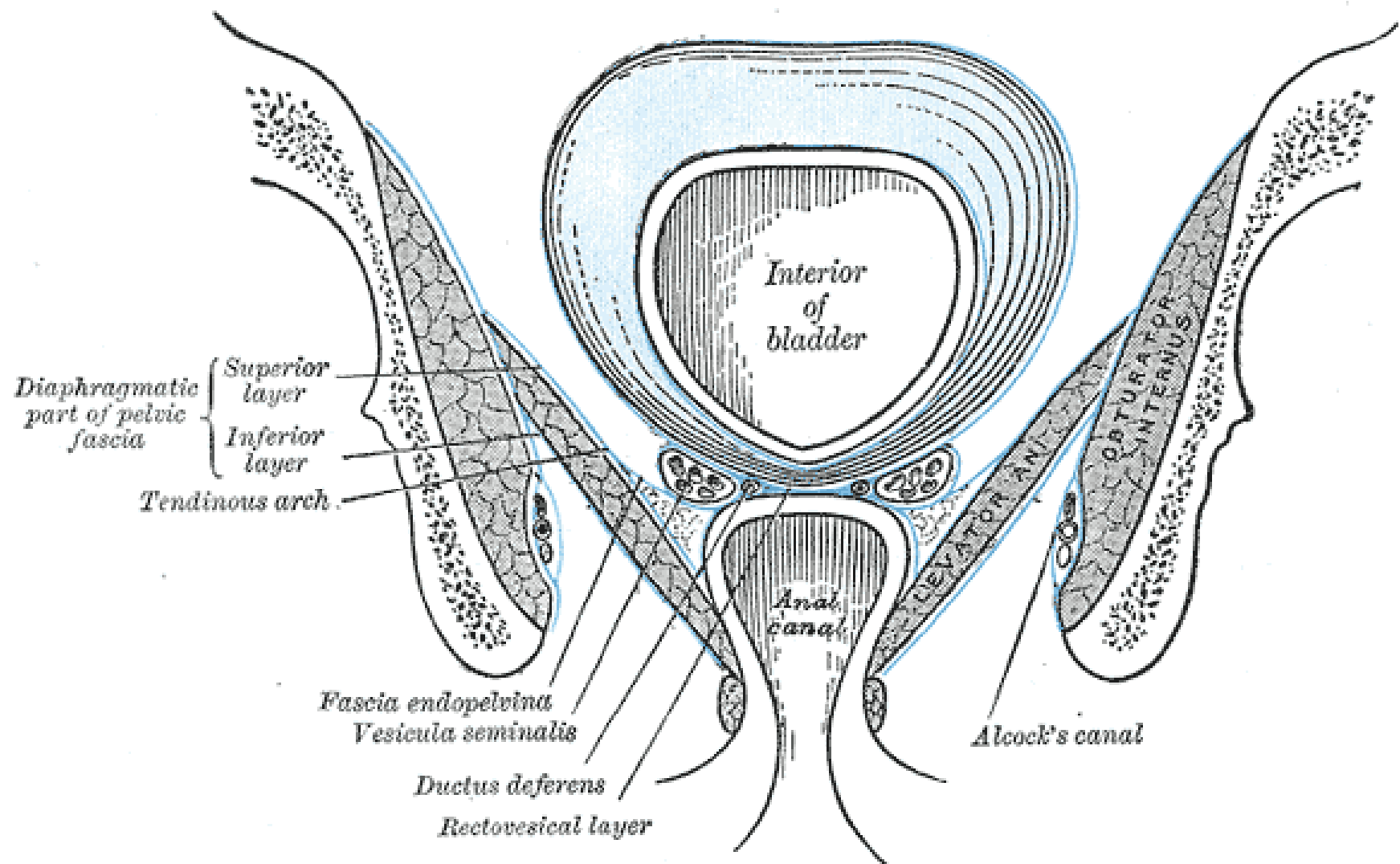
Attachments of the cervix and vagina to pelvic walls (uterine corpus and the bladder have been removed)

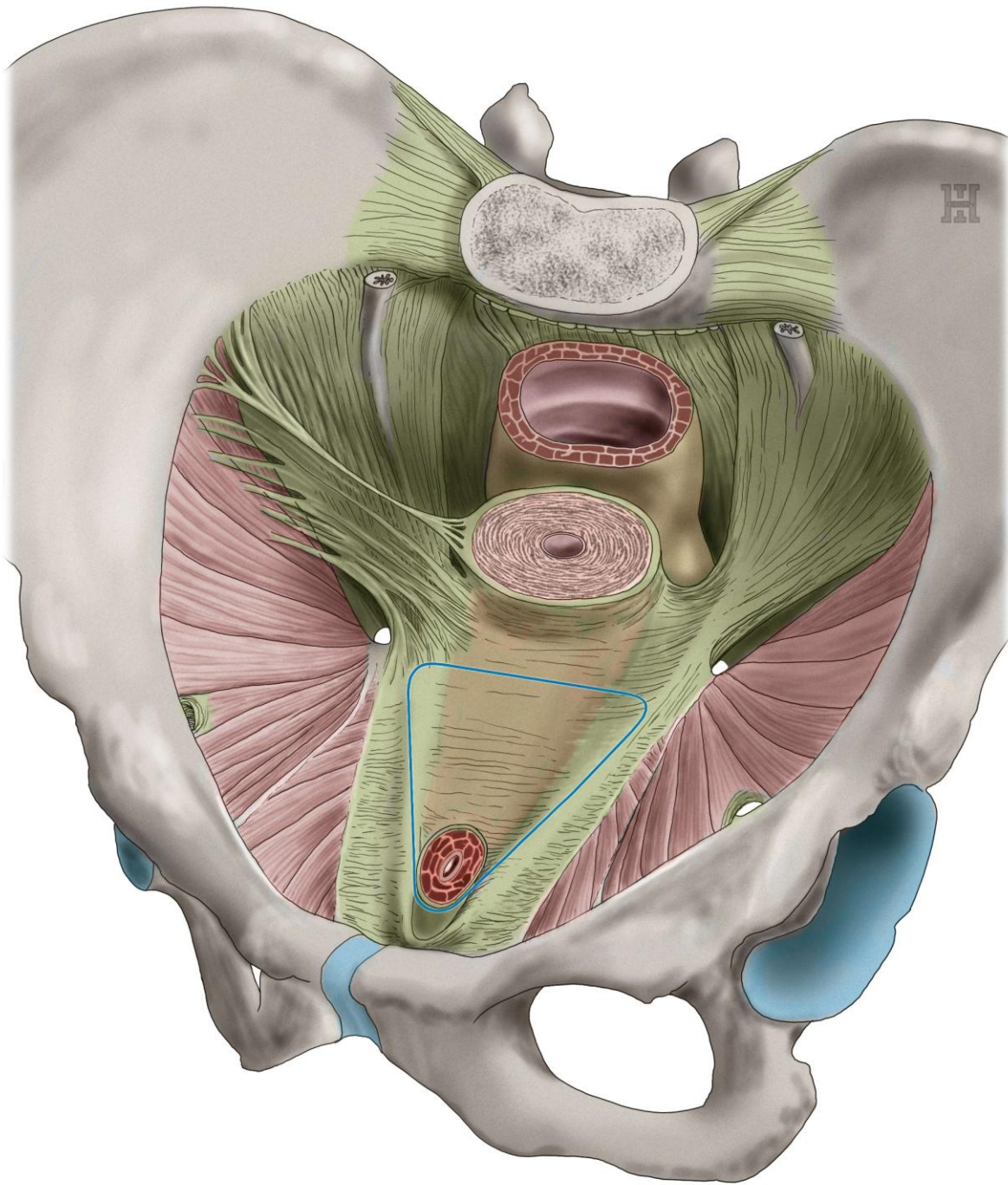
Obturator int.
Tendinous arch of endopelvic fascia
Vagina
Tendinous arch of levator ani
Levator ani
Projection of trigon of the bladder

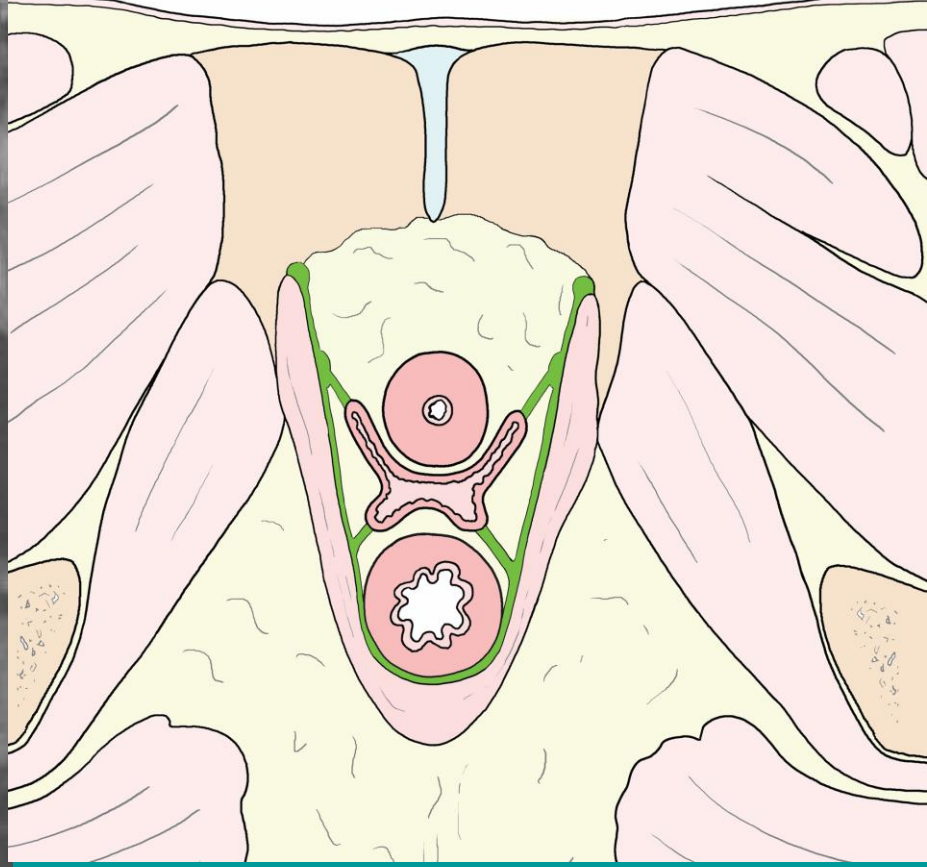
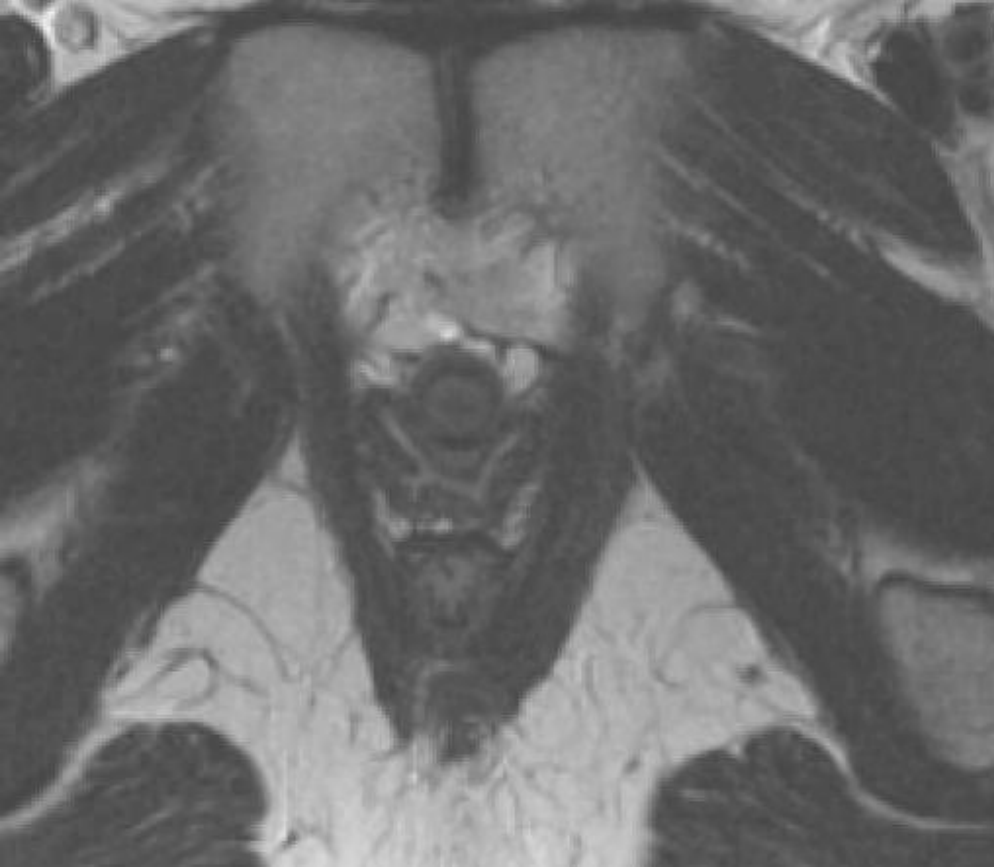
Urethra

**Cervix
uteri**

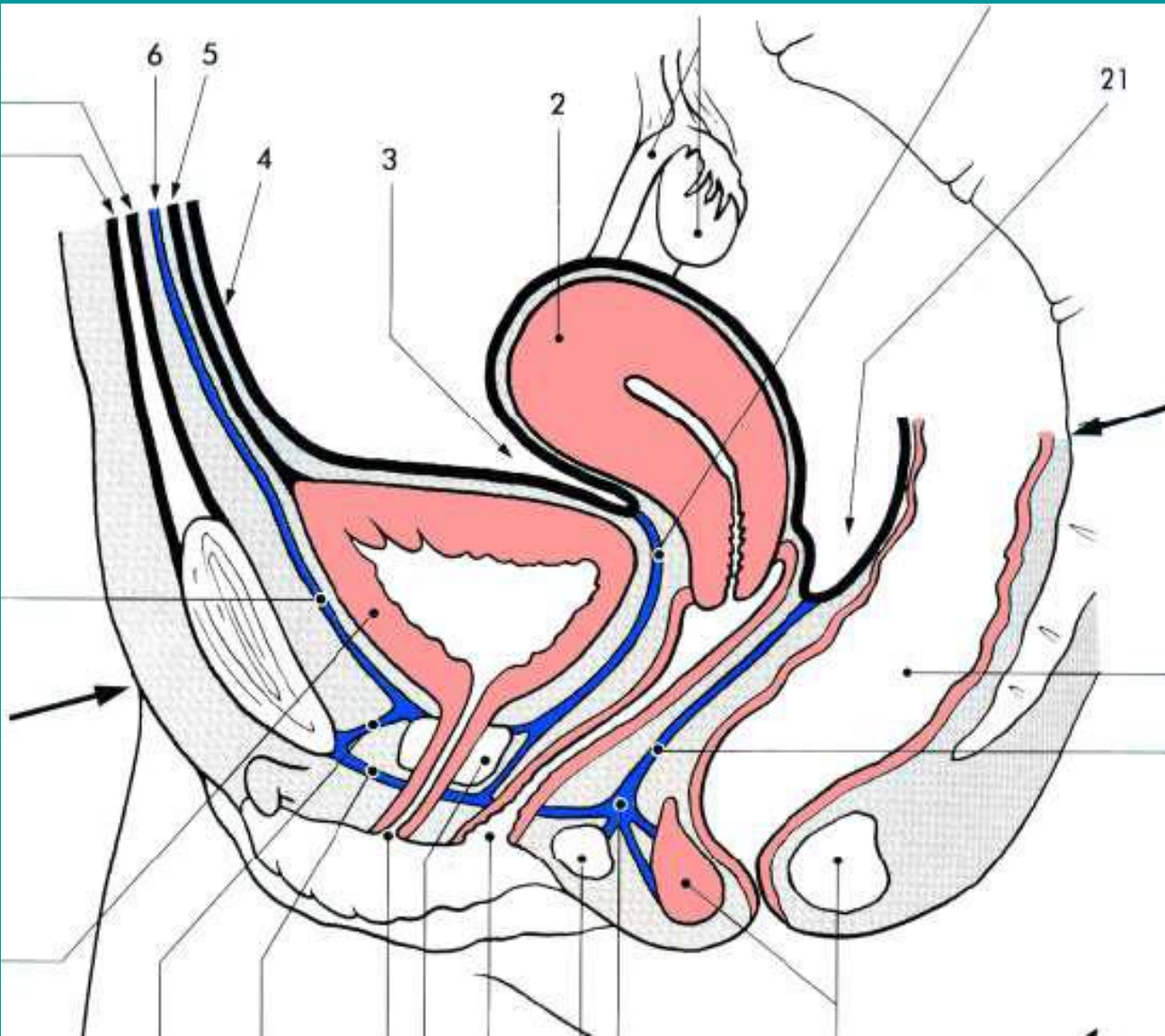


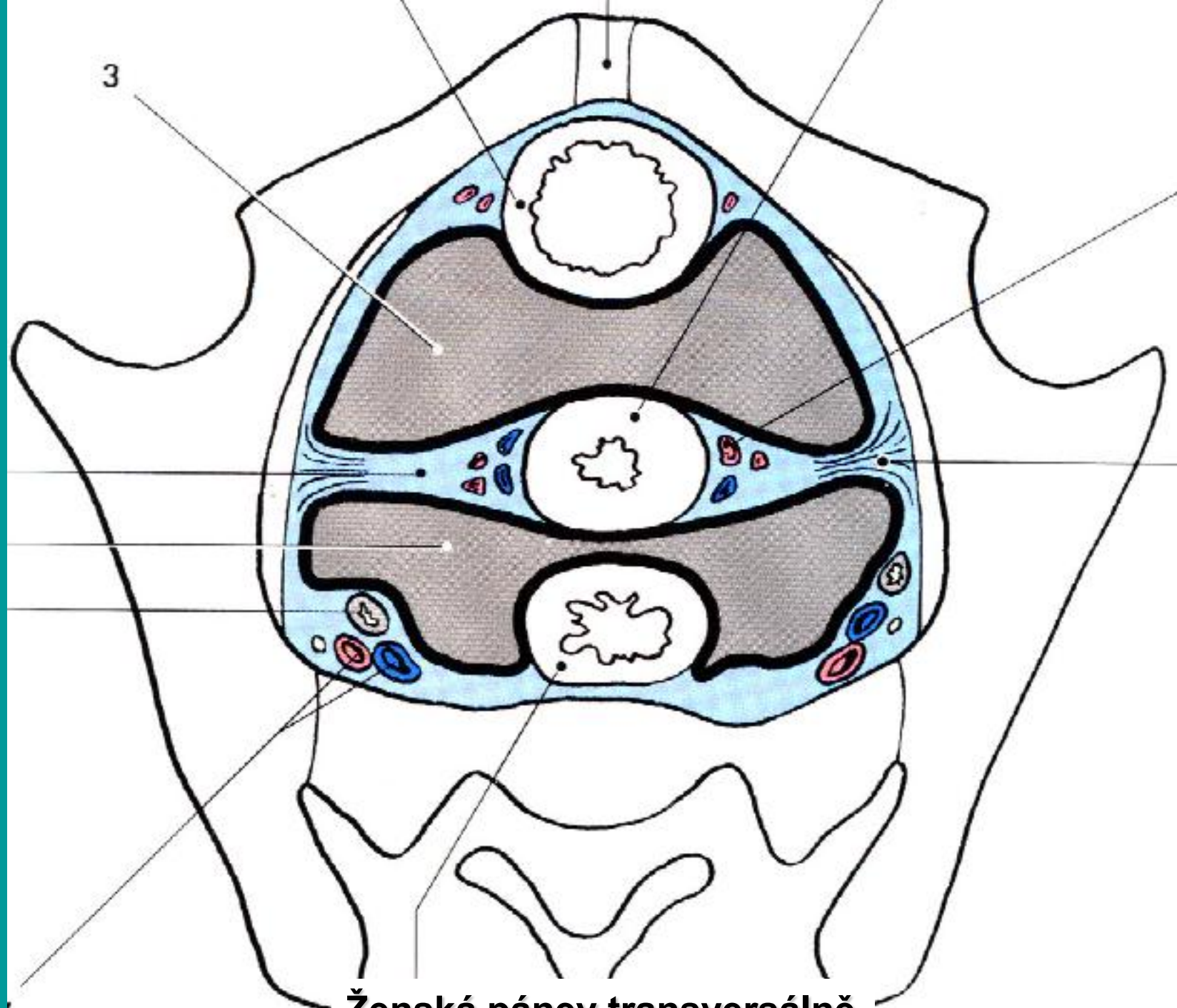






excavatio vesicouterina
excavatio rectouterina
septum vesicovaginale
septum rectovaginale





Ženská pánev transversálně

2. Diaphragma urogenitale

Urogenital diaphragm

Diaphragma urogenitale uzavírá hiatus urogenitalis -
skrze ní prostupuje uretra (a pochva)
v centrum perinei je spojena s diaphragma pelvis
na ní zespodu leží topořivá tělesa + žlázy + mm. perinei

svaly:

M. transversus perinei profundus (**pouze u muže**)

M. sphincter urethrovaginalis (**pouze u ženy**)

M. compressor urethrae (**pouze u ženy**)

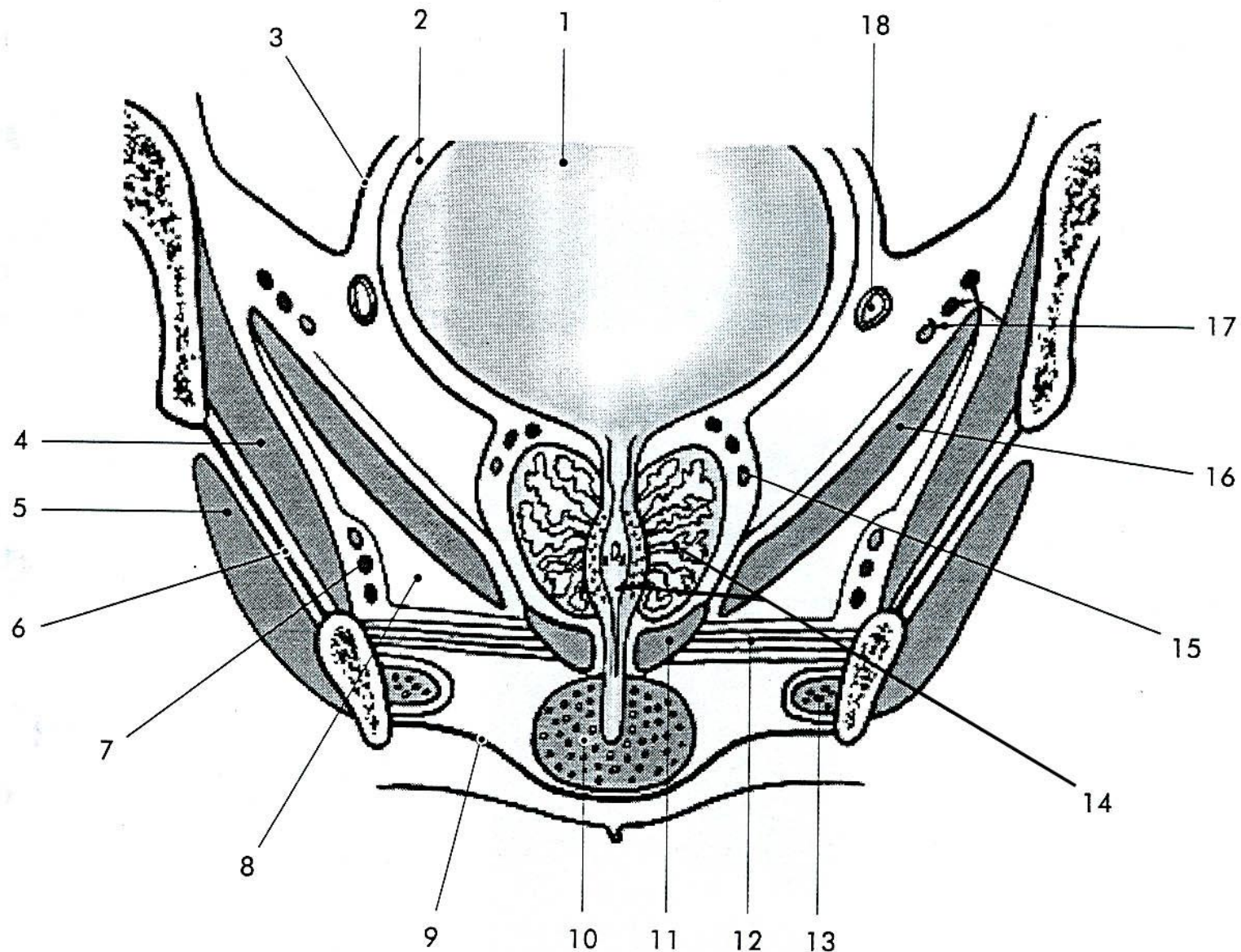
M. transversus perinei superficialis (**variabilní**)

vazivové útvary:

Membrana perinei

Lig. transversum perinei (**pouze u muže**)

Centrum perinei (corpus perineale/perineal body)



Obr. 8.34. Frontální řez pánví v úrovni prostaty. 1 – močový měchýř, 2 – paracystium, 3 – peritoneum, 4 – m. obturatorius internus, 5 – m. obturatorius externus, 6 – membrana obturatoria, 7 – Alcockův kanál a v něm vasa pudenda interna a n. pudendus, 8 – fossa ischioanal, 9 – fascia perinei superficialis, 10 – bulbus corporis spongiosi urethrae, 11 – m. sphincter urethrae externus, 12 – diaphragma urogenitale, 13 – crus penis, 14 – prostata a pars prostatica urethrae, 15 – plexus venosus prostaticus, 16 – m. levator ani, 17 – n. a vasa obturatoria, 18 – ductus deferens

3. Mm. perinei

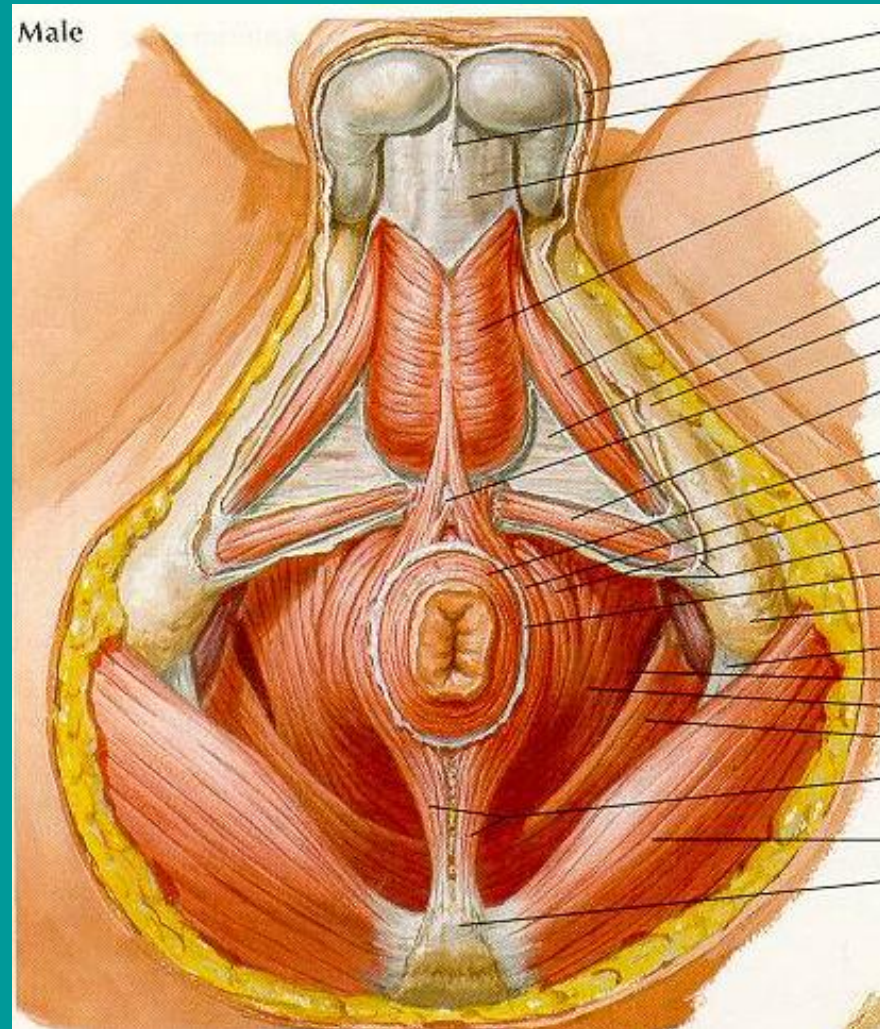
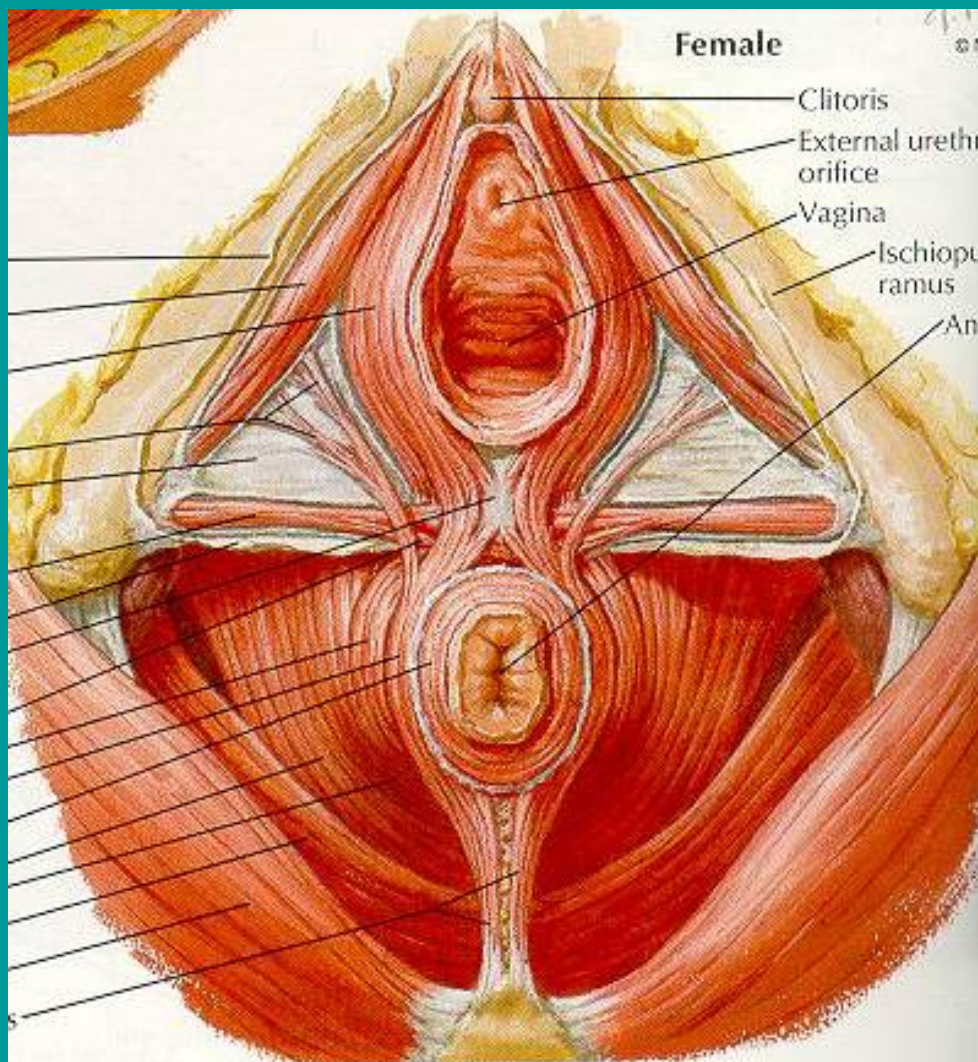
Perineal muscles

Perineum, hráz, v užším (porodnickém) pojetí: příčný pruh měkkých tkání mezi análním otvorem a zadním okrajem vestibulum vaginae (commissura labiorum posterior)

Širší (anatomické) použití termínu **perineum** (**regio perinealis**) zahrnuje celou oblast pánevního východu a člení se na přední **regio urogenitalis**, a zadní část, **regio analis**.

Hlubokou hranicí perinea je spodní plocha diaphragma pelvis a patří sem proto i obsah **fossa ischioanalis**.

Svaly hráze



Regio perineale - **Urogenital triangle**, regio urogenitalis - **Anal triangle**, regio analis, - **Ischio-anal fossa**, fossa ischioanalis (ischioirectalis) **Perineum**

3. Mm. perinei

M. sphincter urethrae externus

M. sphincter ani externus

M. bulbospongiosus

M. ischiocavernosus

Mm. perinei, svaly hráze

mm. regionis analis

m. sphincter ani externus

mm. regionis urogenitalis

m. sphincter urethrae externus

+ sphincter urethrovaginalis

+ compressor urethrae

m. ischiocavernosus

m. bulbospongiosus

Fibrous structures:

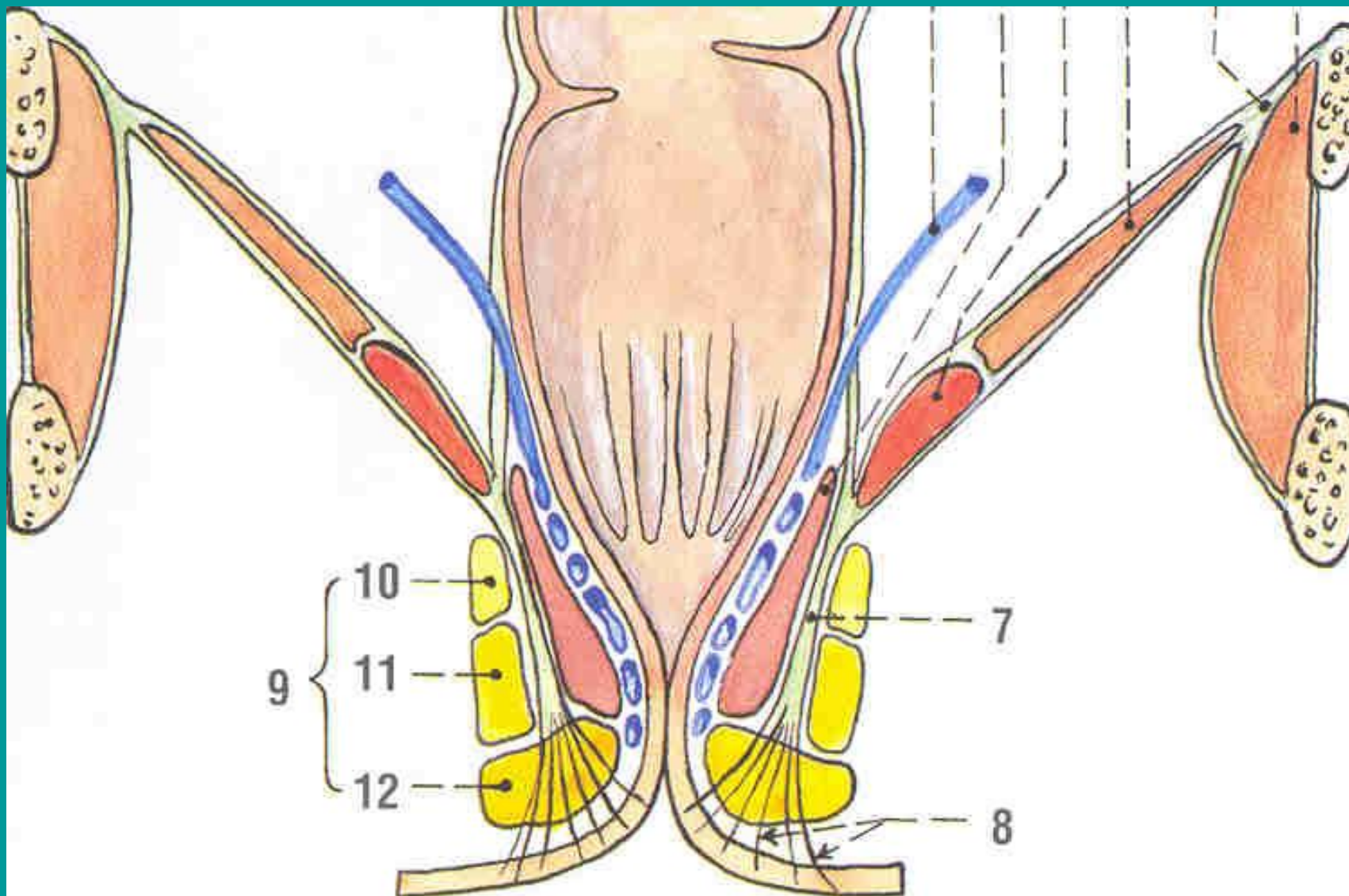
Perineal body, Anococcygeal lig.

Fossa ischioanal

Corpus adiposum fossae ischioanal

Canalis pudendalis (Alcockův kanál)

M. sphincter ani externus (žlutě)



M. sphincter ani externus

pars subcutanea - těsně pod kůží okolo análního otvoru, rozdělena vazivovými pruhy, které se upínají v okolí análního otvoru

pars superficialis - leží nad pars subcutanea, je silný 0,5 - 1,5 cm a vysoký 1,5 cm, je to nejsilnější část sfinkteru

pars profunda - tvoří prstenec a vidlici v úrovni m. puborectalis a spolu s ním vytváří **m. compressor recti**, nejdůležitější složku continentia alvi

Funkce: stav trvalé kontrakce – relaxace při defekaci, zvýšený tonus při zadržení stolice

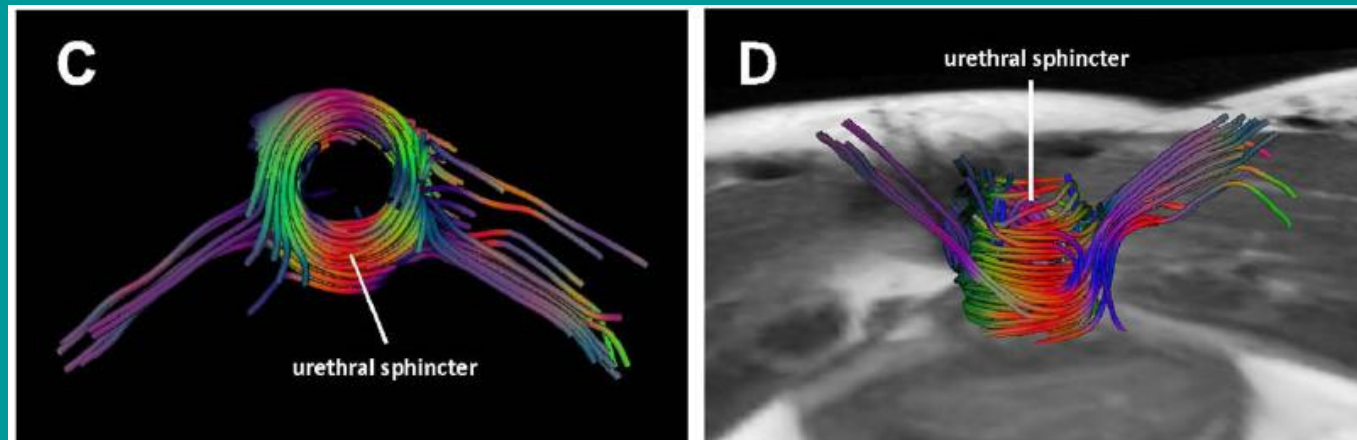
Inervace: n. pudendus

M. sphincter urethrae externus

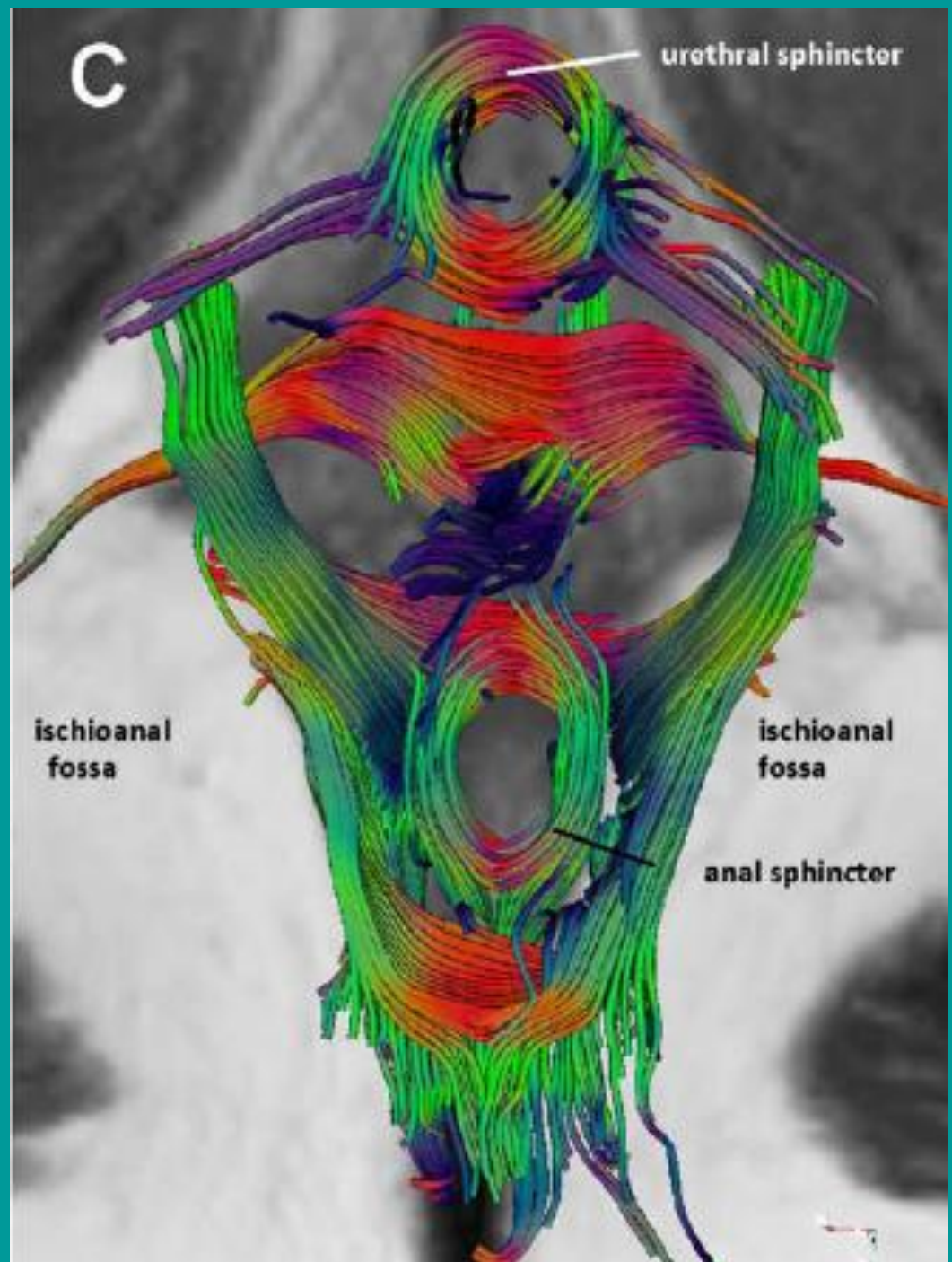
leží nad a v úrovni diaphragma urogenitale, obkružuje uretru, je silnější po stranách a dorzálně, obsahuje pomalá svalová vlákna, dlouhodobě udržuje svalový tonus
kaudální snopce přecházejí na boky pochvy, kraniální snopce na apex prostaty

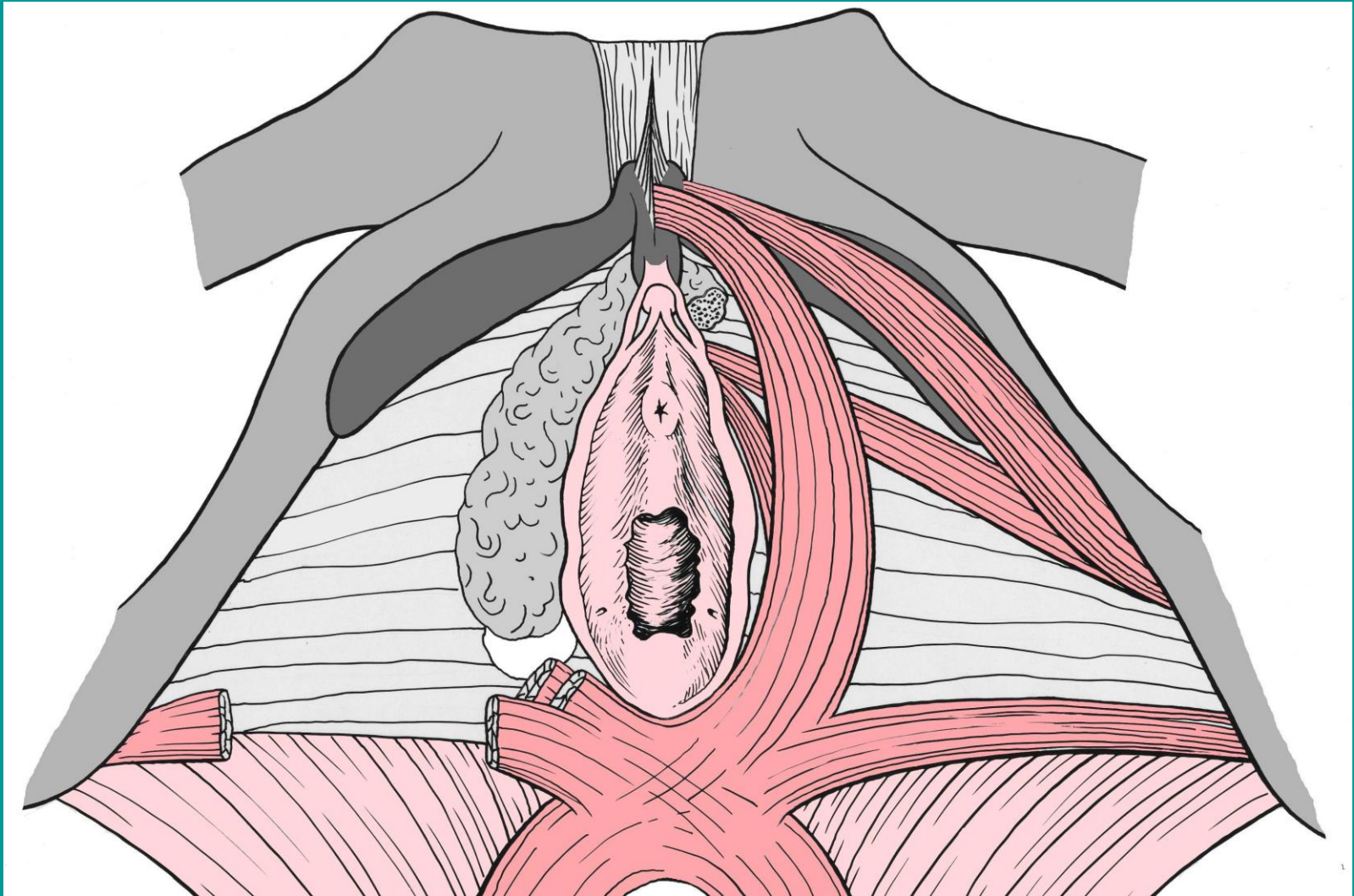
Inervace cestou n. pudendus z motoneuronů Onufova jádra v S2 a S3

M. sphincter urethrovaginalis, M. compressor urethrae



Zijta M et al. Clin Anat
26:110–114 (2013)
Axial T2-weighted image
of a 26-year-old nullipara.
C demonstrates
the multidirectional
organization of the
complex pelvic floor anatomy.
The per-voxel vector values
are color coded as follows:
green (anteroposterior direction),
blue (craniocaudal direction),
and red (mediolateral direction).





Female external genitalia and perineal muscles - Bulbospongiosus, Ischioanal, Compressor of urethra, Urethrovaginal sphincter, Superficial transverse perineal muscle
m. levator ani, m. sphincter ani externus, centrum perinei

3b. Mm. perinei

Perineal muscles

VÝVOJ

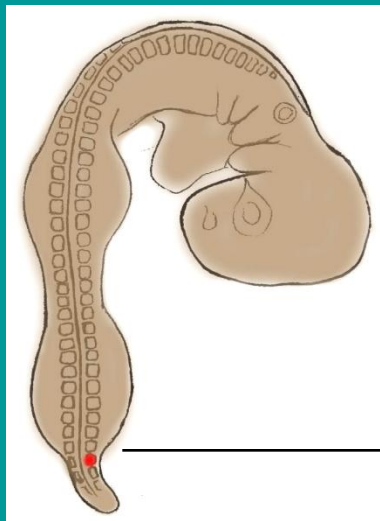


kuře
Gallus gallus domesticus

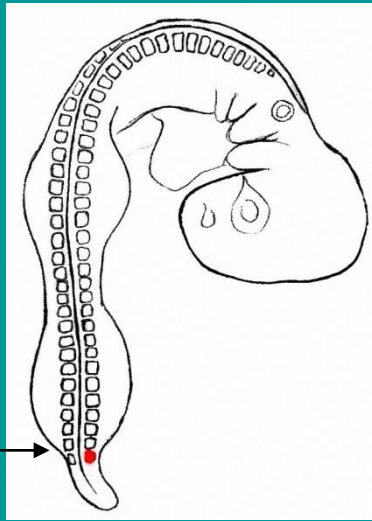


křepelka
Coturnix coturnix japonica

Segmental origin of muscles



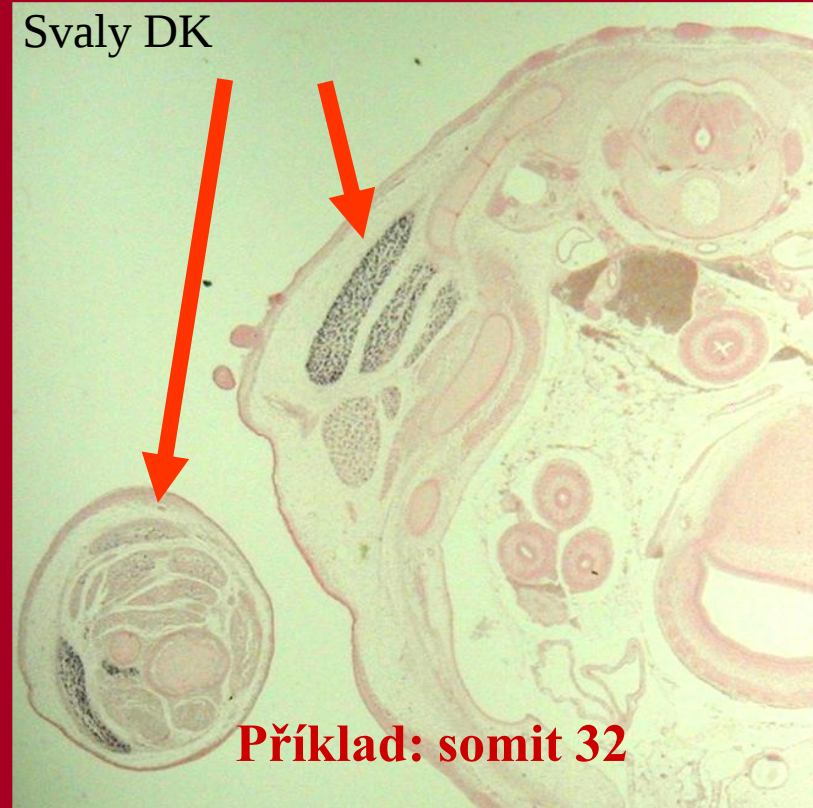
quail



chick

ED3

Svaly DK

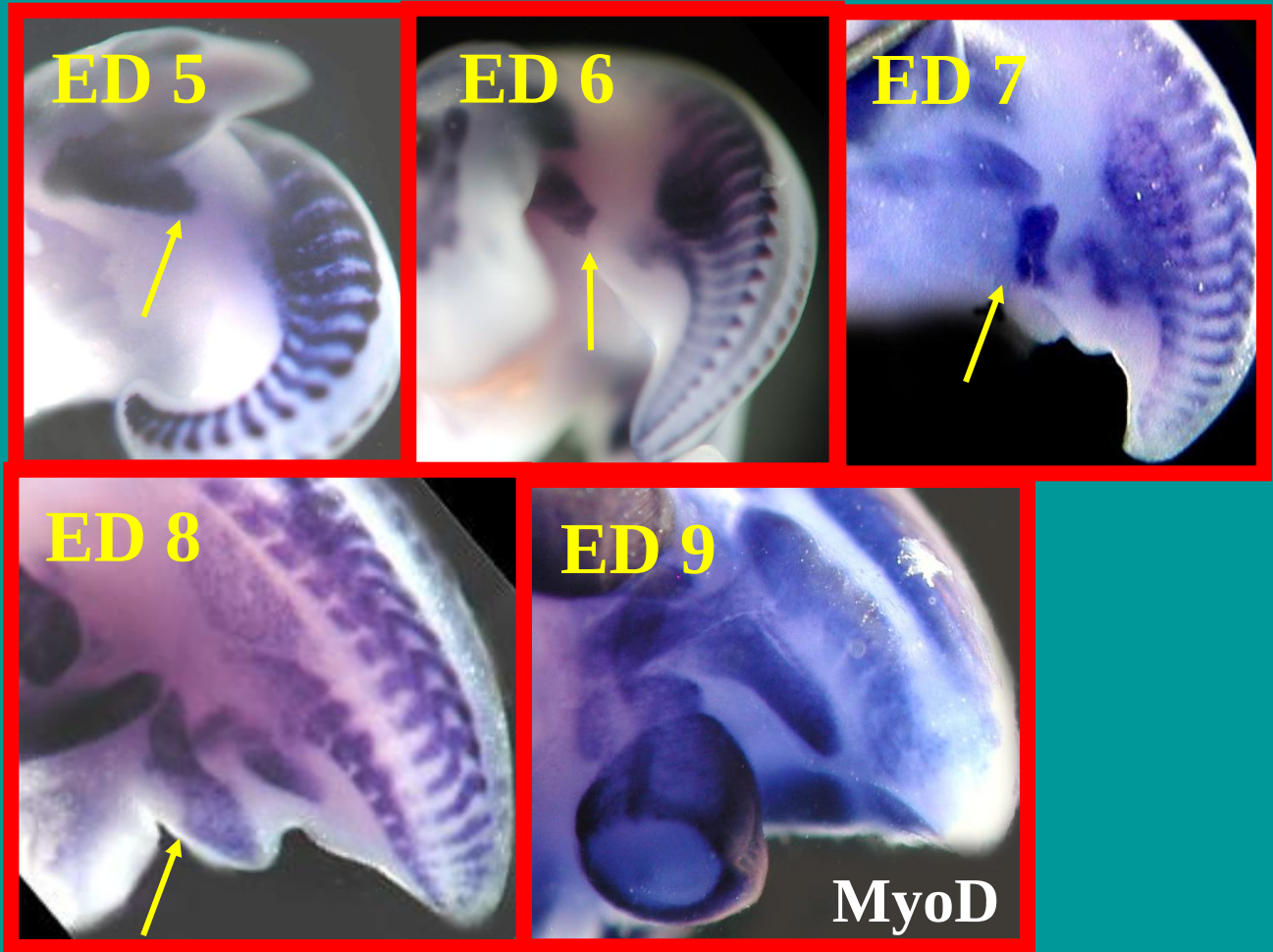
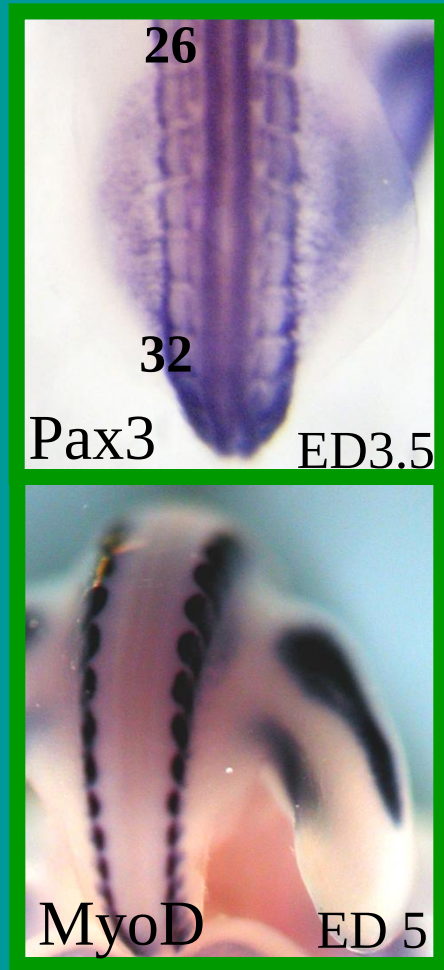


Příklad: somit 32



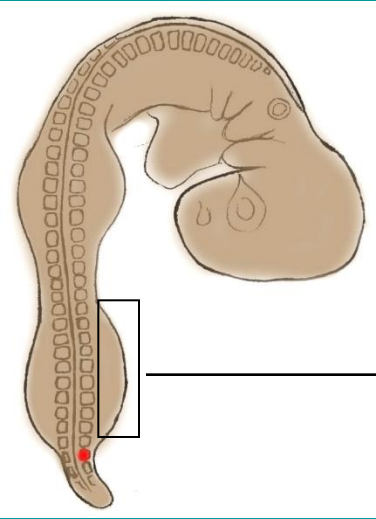
ED10

Molecular analysis of chick cloacal musculature development

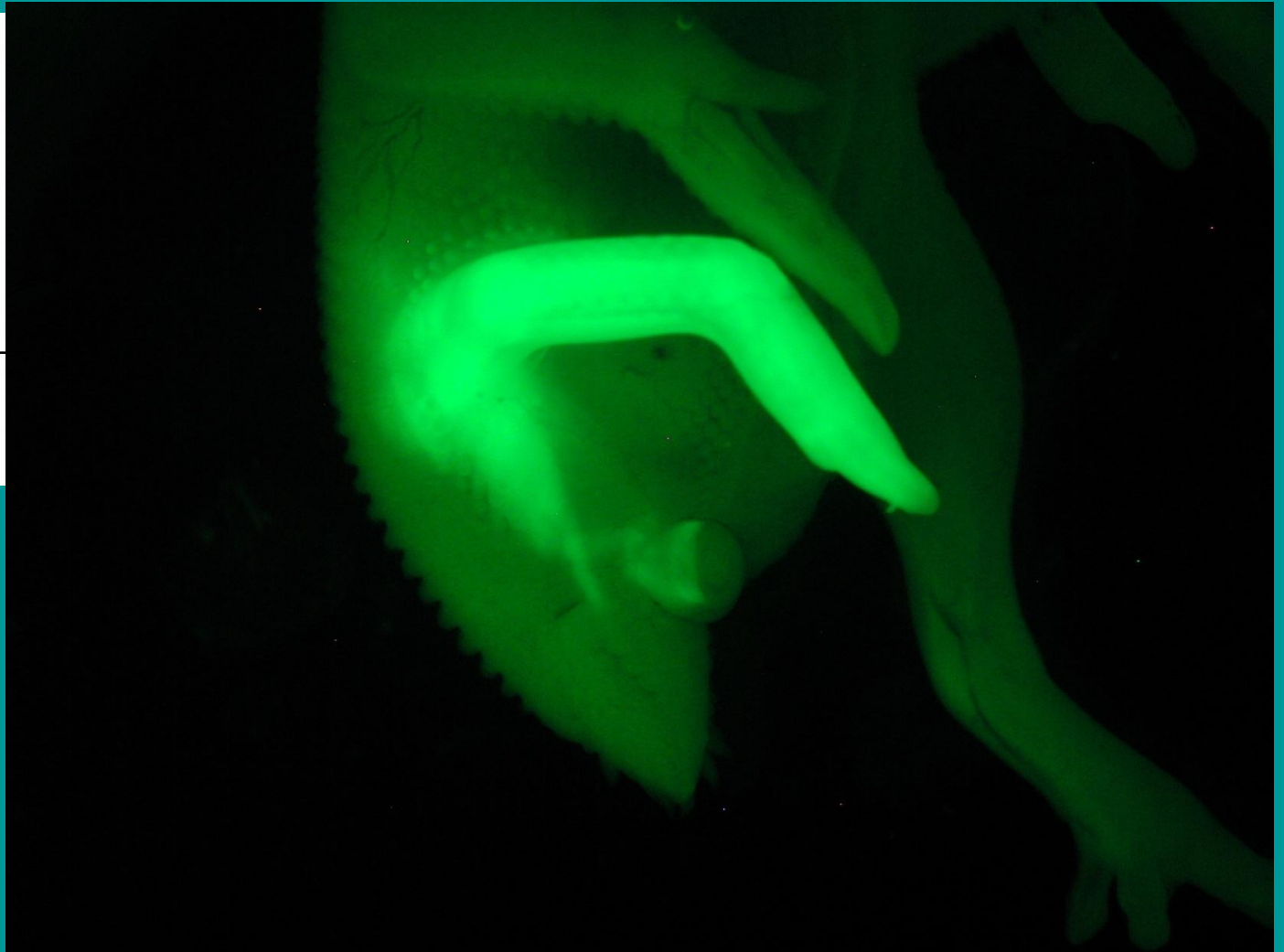


Phase 1 – migration do leg - „In“
Phase 2 – extension from leg - „Out“

The base of a leg gives off muscle cells for cloaca



GFP chick

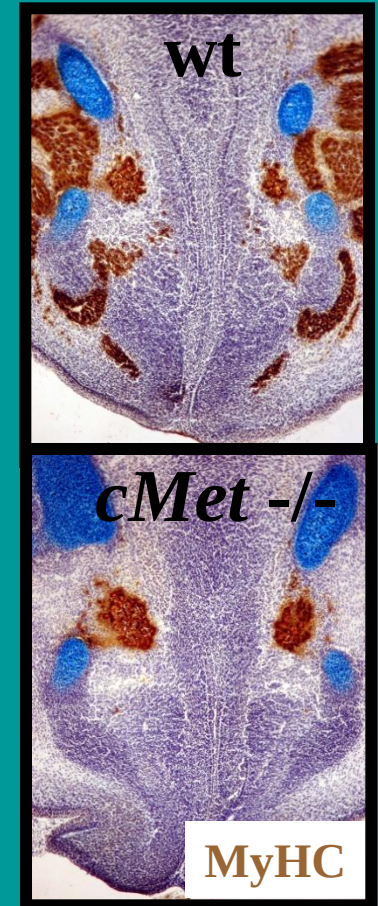
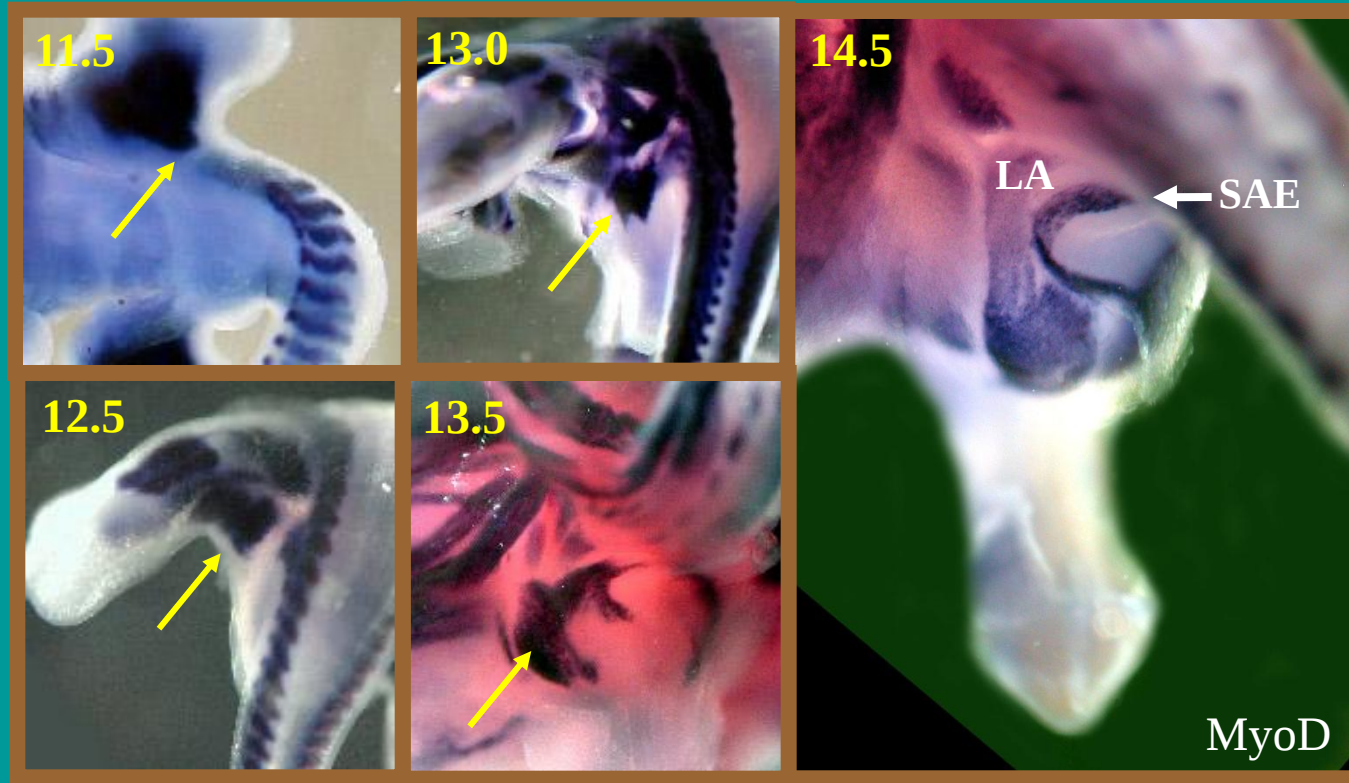


wing

ED 4

ED10

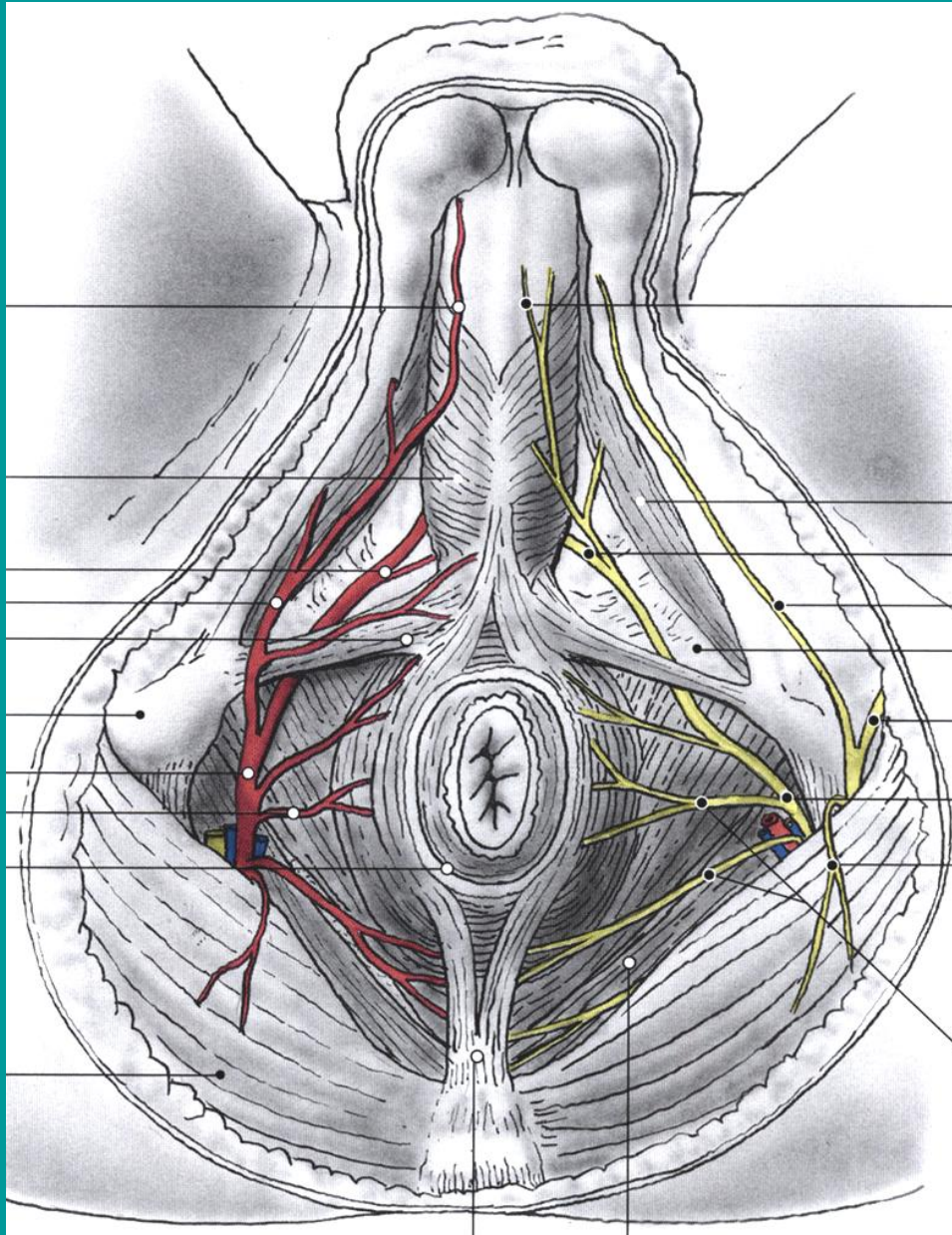
Mouse cloacal-perineal muscles in *cMet*^{-/-}



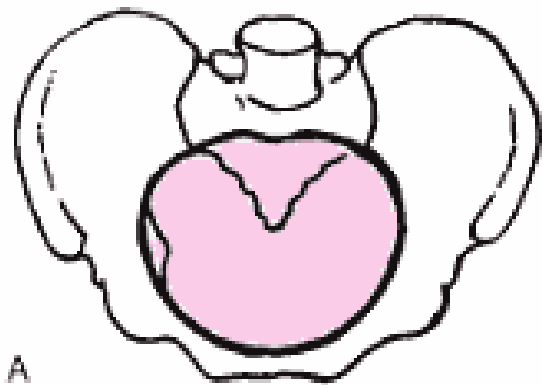
1. Also murine cloacal muscles develop from flexors

2. *cMet*^{-/-} confirms migratory mechanism

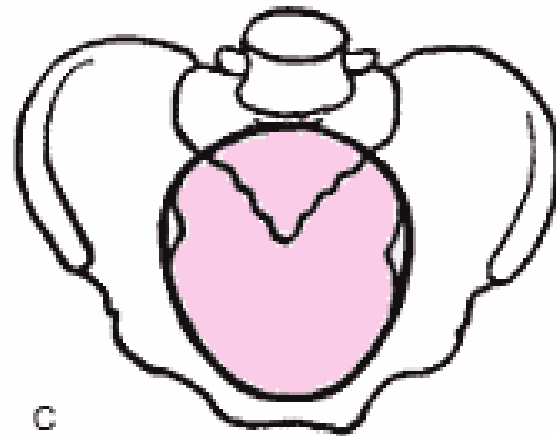
n. pudendus a jeho neobvyklý průběh...



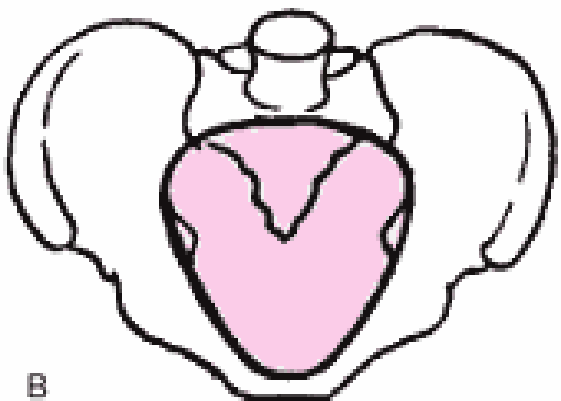
Pánevní dno & Porod



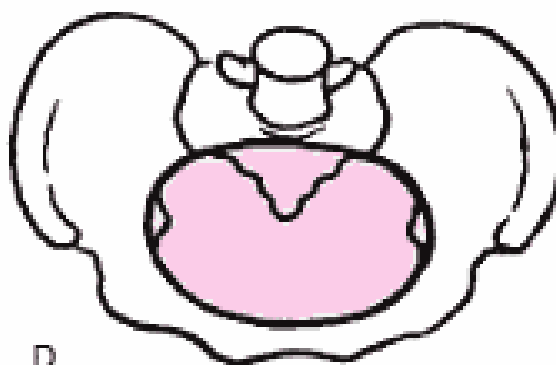
A



C



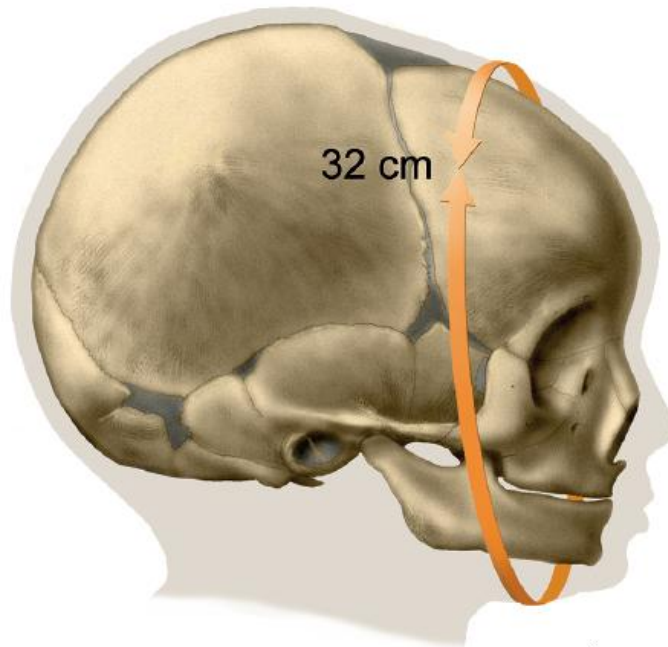
B



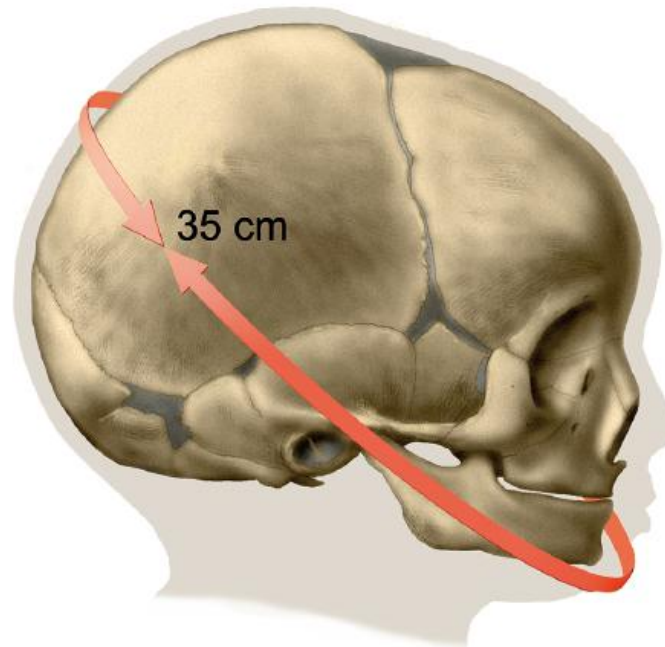
D

Typy pánví u ženy:

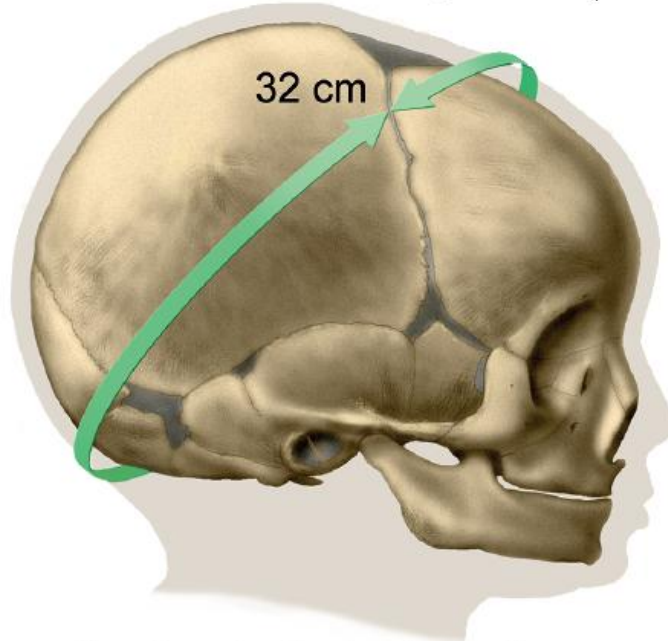
- A. **Gynoidní** typ (výskyt 40%) je typicky ženský se zaobleným předním i zadním segmentem.
- B. **Androidní** typ (výskyt 30%) má úzký přední segment a klínovitý aditus pelvis.
- C. **Anthropoidní** typ (výskyt 20%). Aditus pelvis má tvar úzkého dlouhého oválu.
- D. **Platypeloidní** typ (výskyt 3%). Aditus pelvis má plochý příčné oválný tvar.



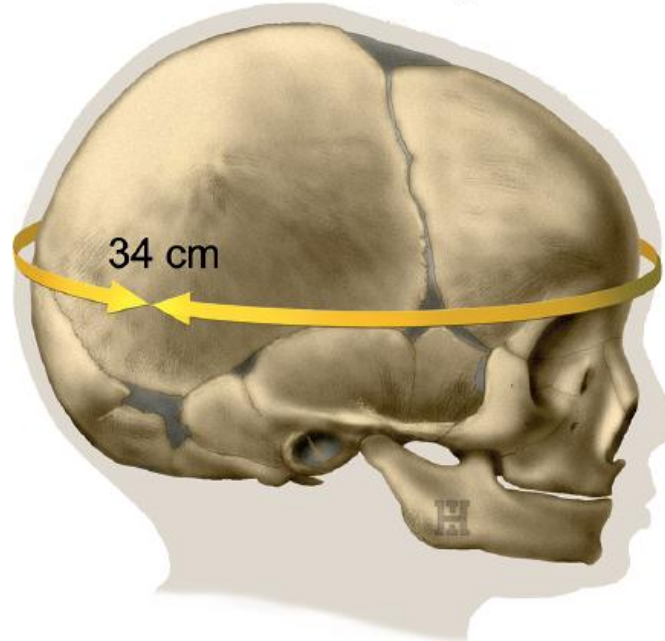
circumferentia submentobregmatica 32 cm



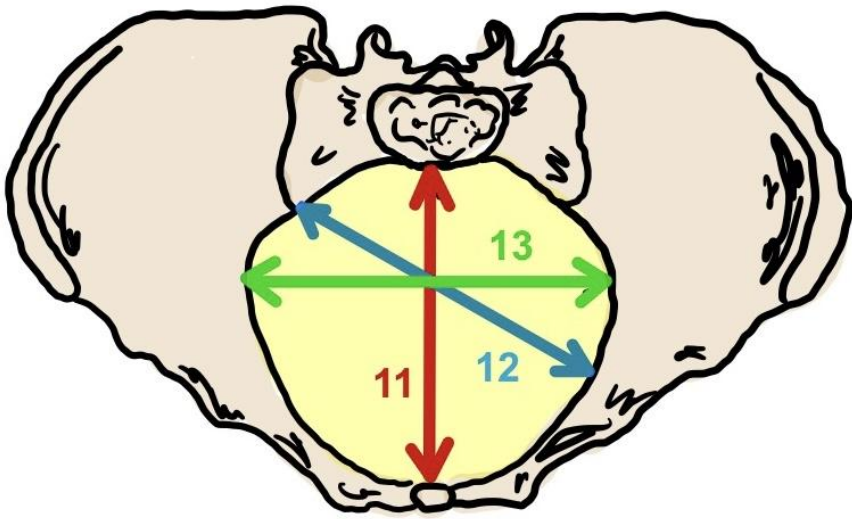
circumferentia mentooccipitalis 35 cm



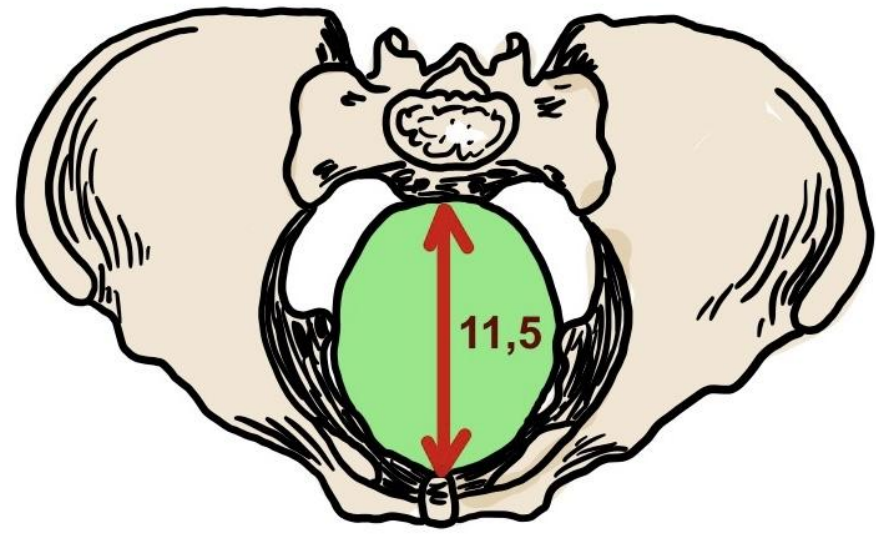
circumferentia suboccipitobregmatica 32 cm



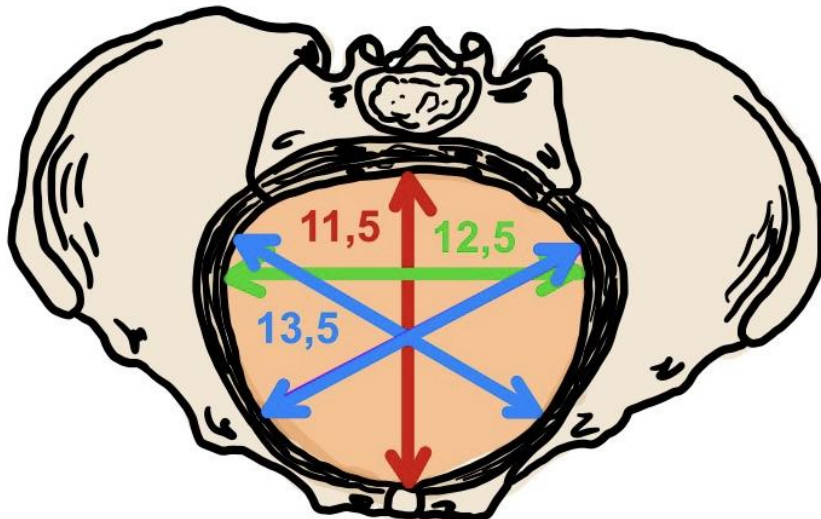
circumferentia frontooccipitalis 34 cm



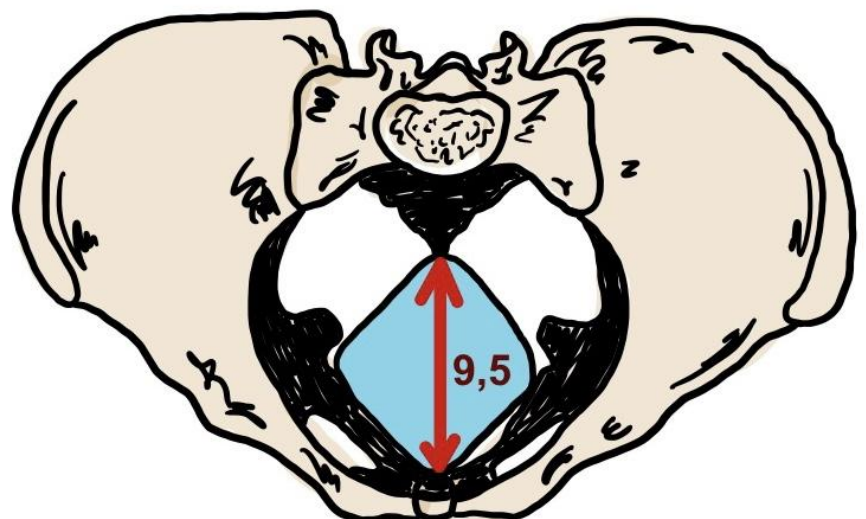
ADITUS



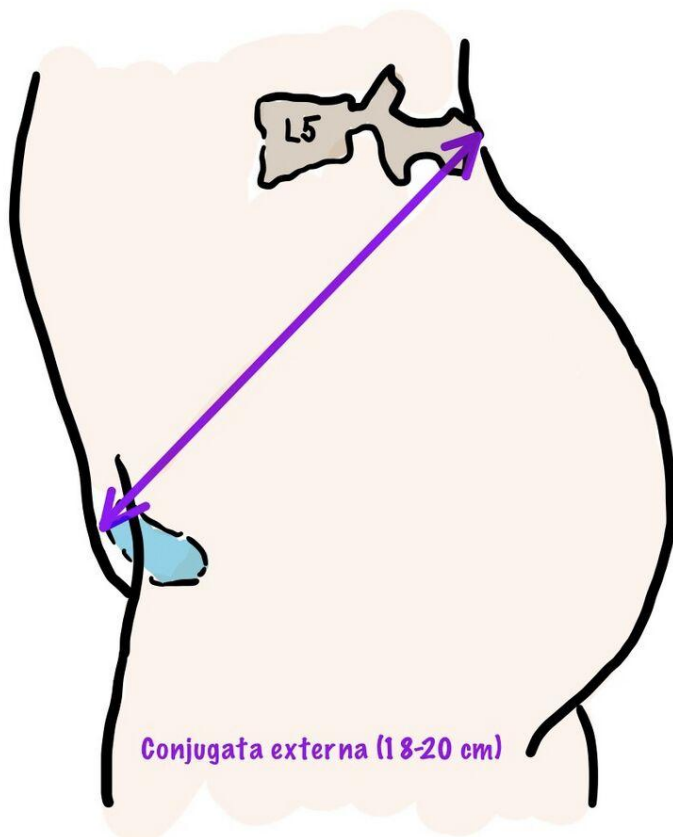
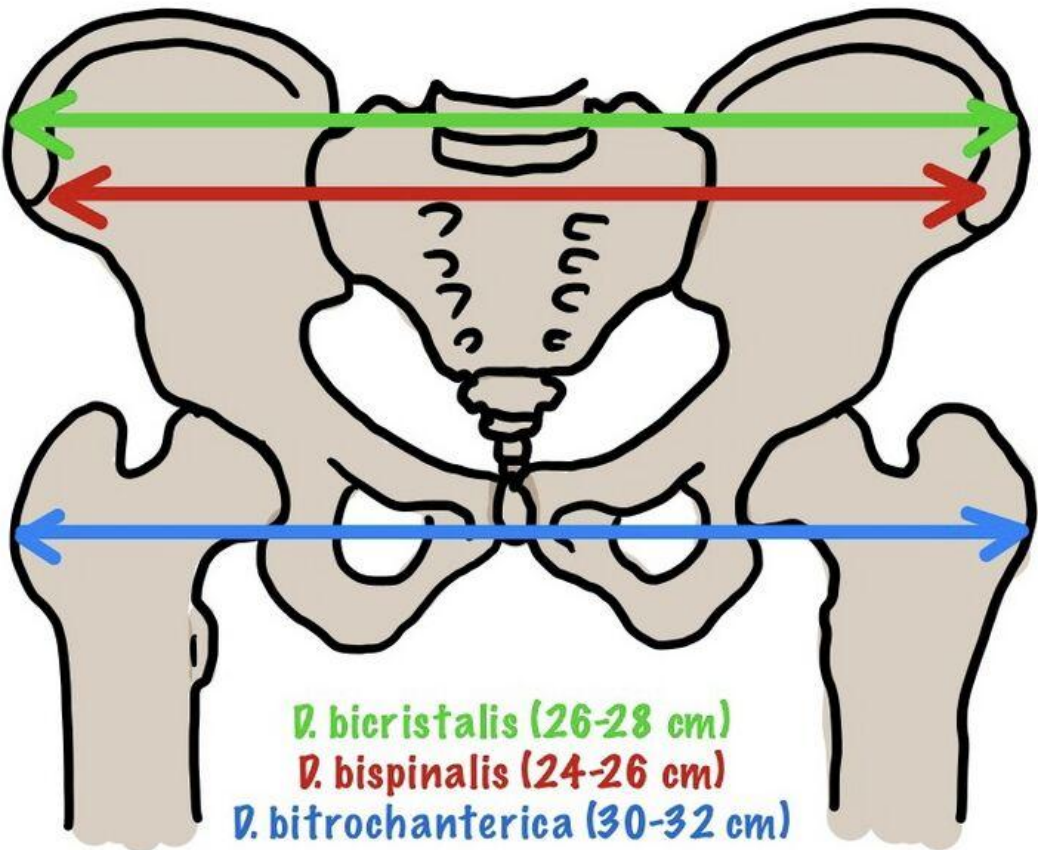
ANGUSTIA



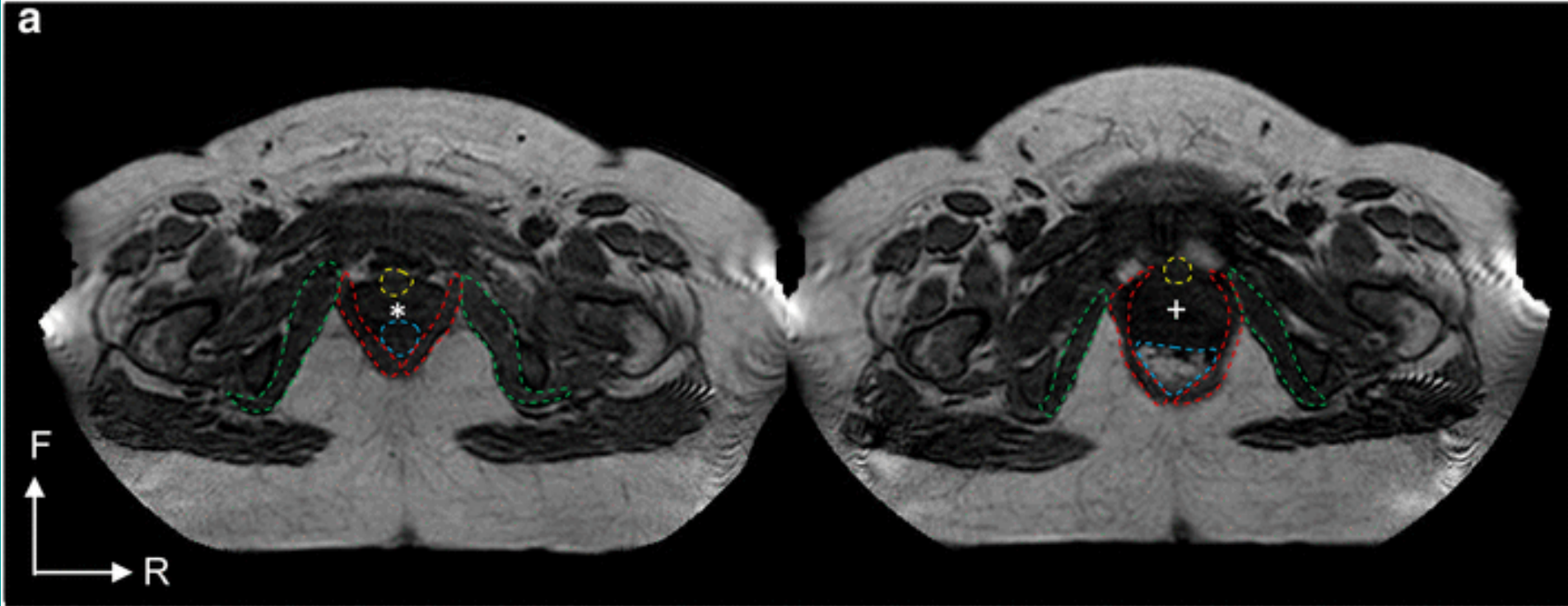
AMPLITUDO



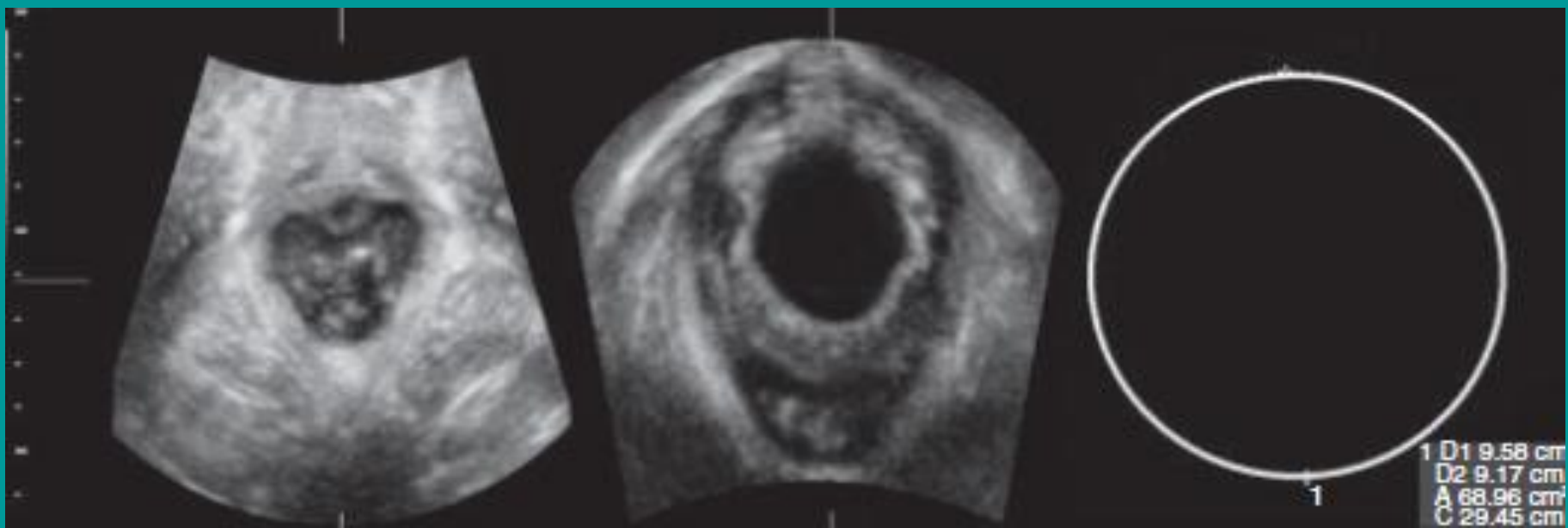
EXITUS



26cm
29cm
31cm



Comparative anatomy on 3-D MRI of the urogenital sinus and the periurethral area before and during the second stage of labor during childbirth Apr 2018



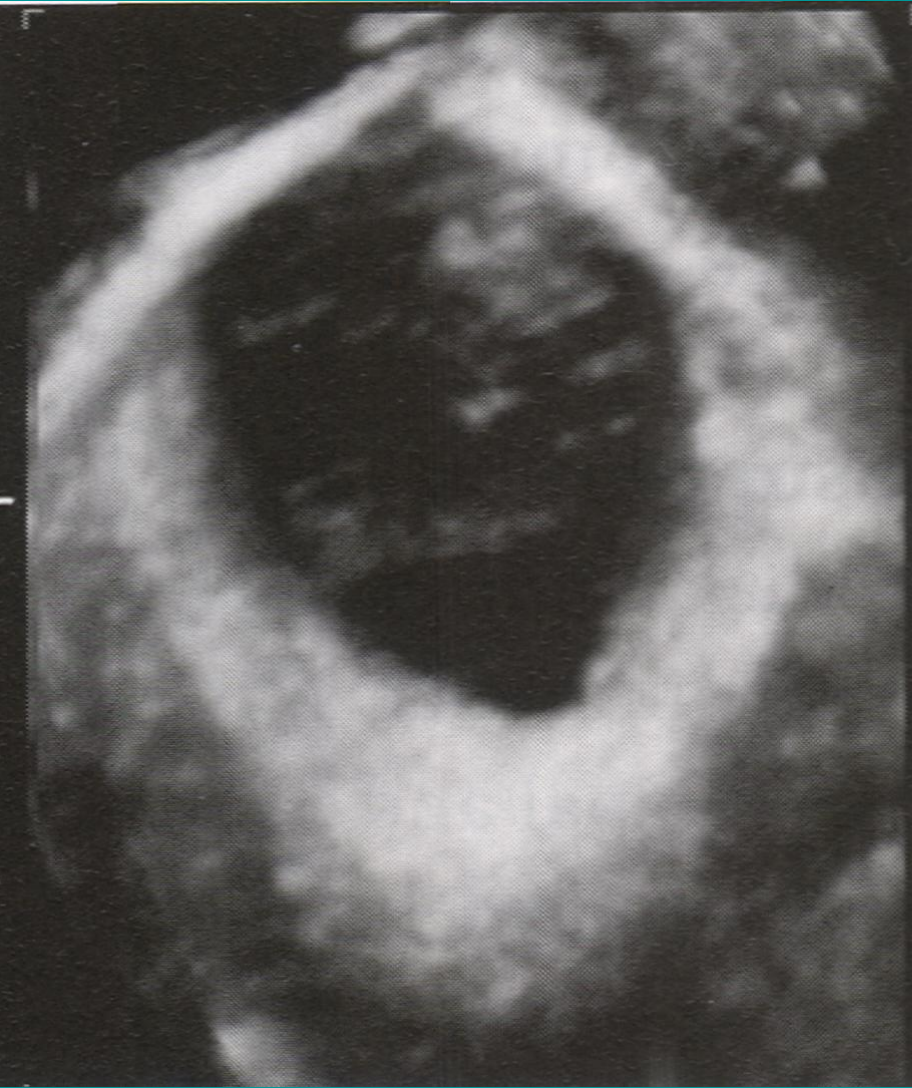
Pacientka s minimálně (vlevo) a maximálně (uprostřed) roztažitelným hiatus urogenitalis (okraj m. puborectalis). Vpravo kontura hlavičky plodu v době porodu.

The ultrasound data sets of 227 nulliparous women examined at 36–38 week's gestation were investigated. Minimal hiatal diameters were measured at rest, on Valsalva and pelvic Floor muscle contraction: some women will have to distend only 25%, others by 245%.

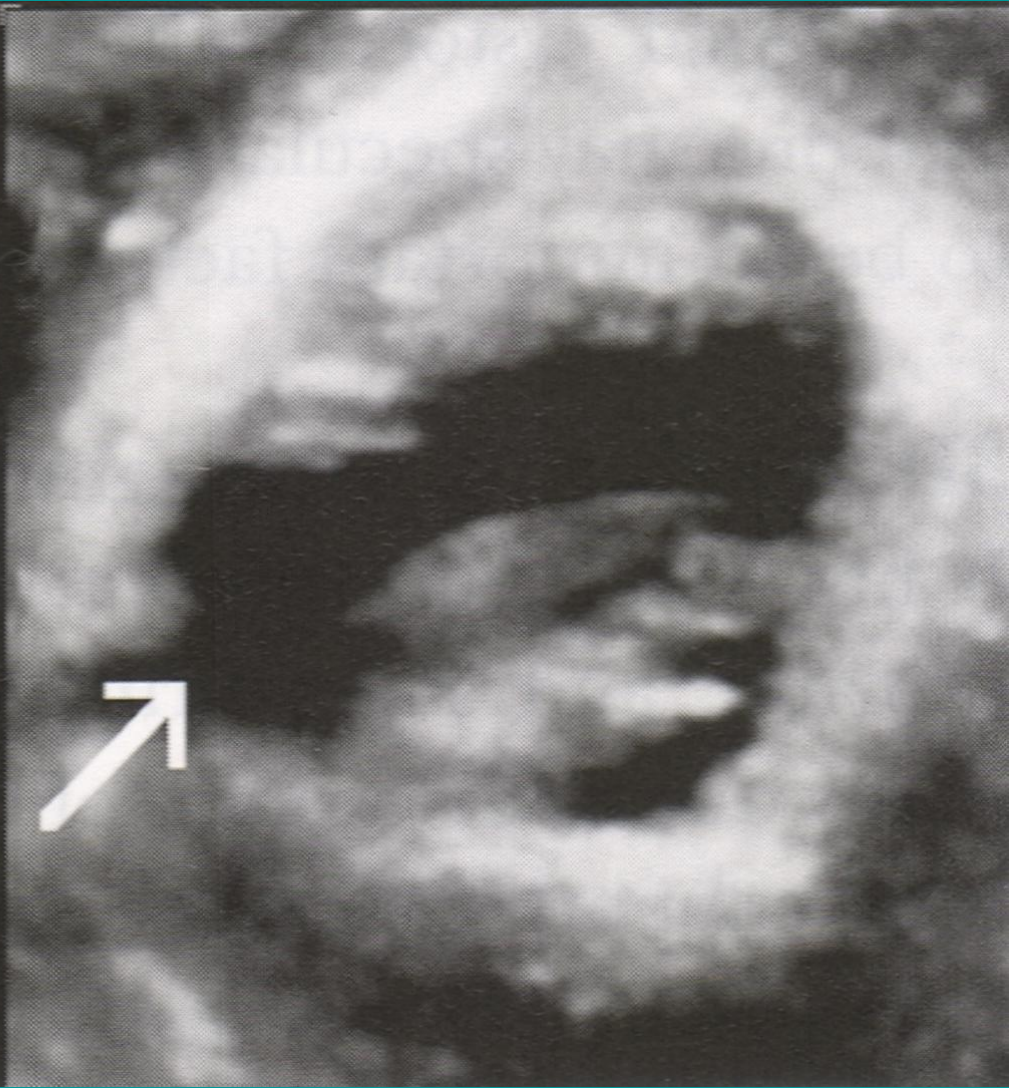
Since childbirth-related trauma to the levator ani is common and clinically important, one should consider potential preventative measures. One approach would be to avoid vaginal delivery by performing elective Caesarean Section.

(Svabik K, Shek K, Dietz H. How much does the levator hiatus have to stretch during childbirth? BJOG 2009;116:1657–1662.)

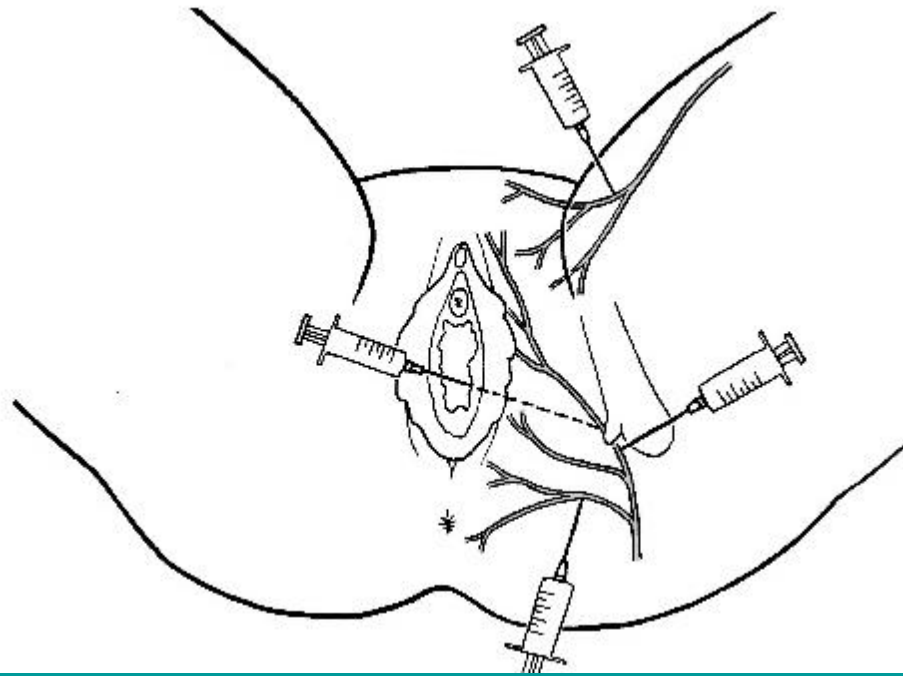
MRI picture of levator ani muscle



Normal condition



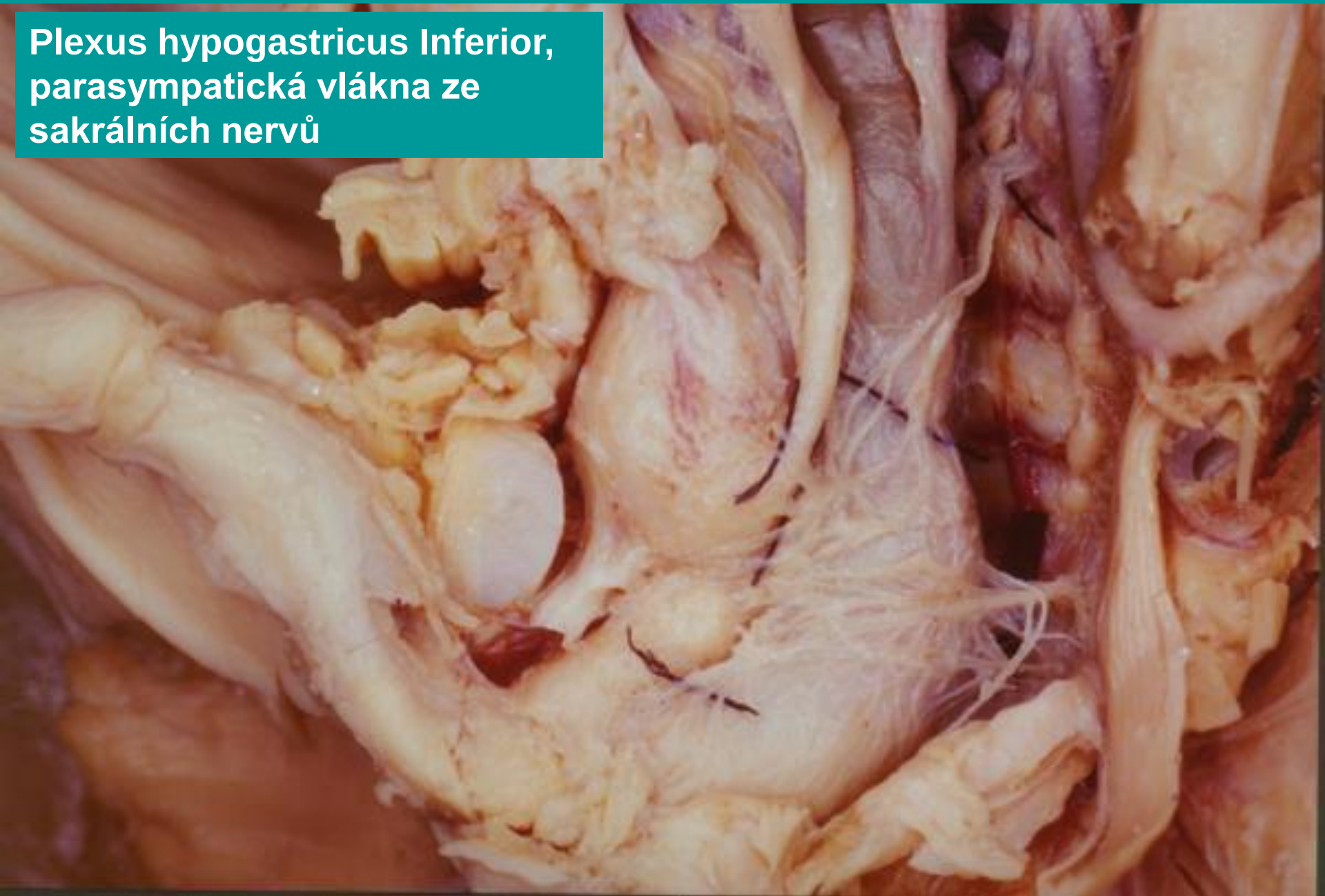
Avulsion after childbirth



n. ilioinguinalis

n. pudendus

**Plexus hypogastricus Inferior,
parasymptická vlákna ze
sokrálních nervů**



in vitro fertilizace

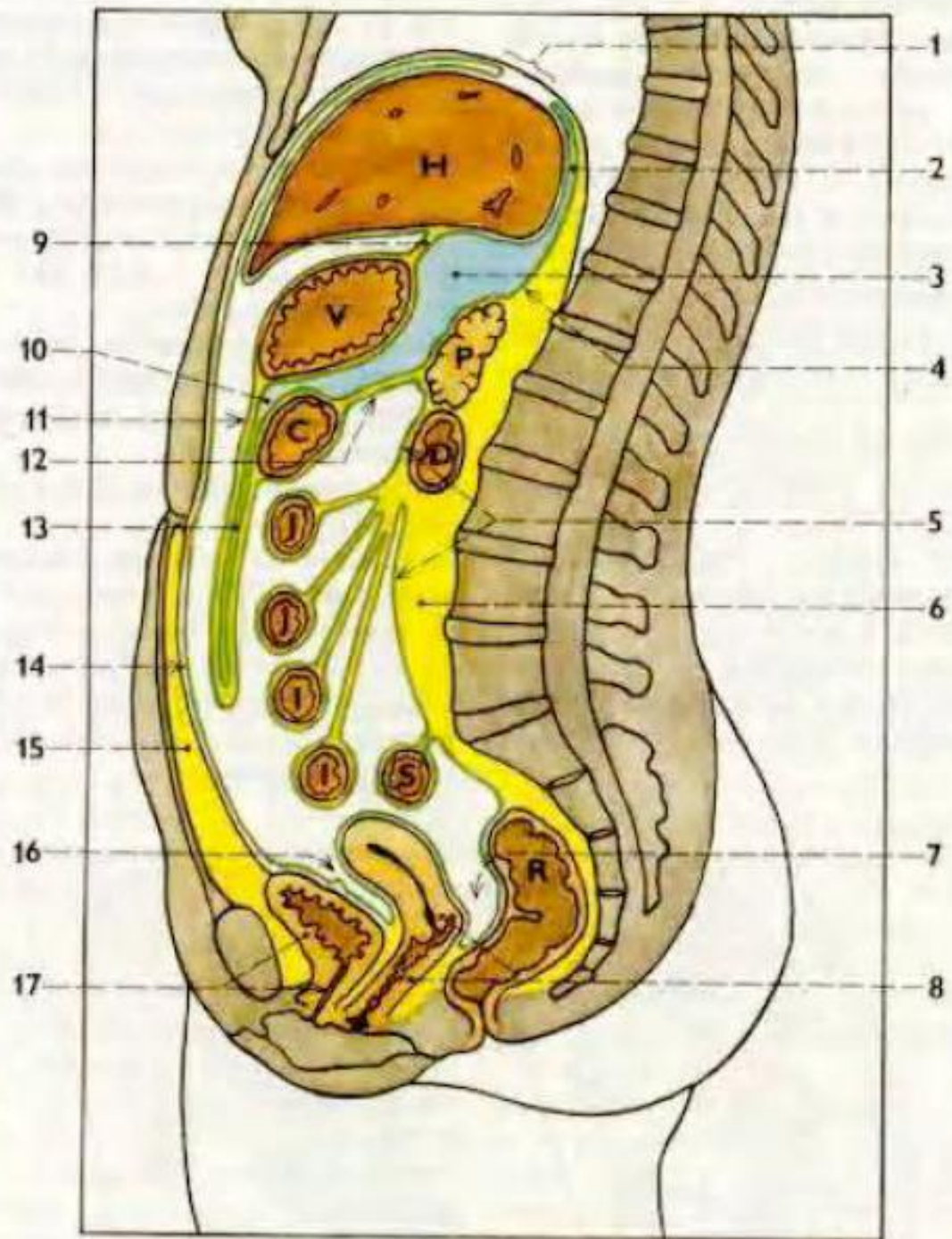
duvody neplodnosti u muze i u zeny

mimodelozni tehotenstvi

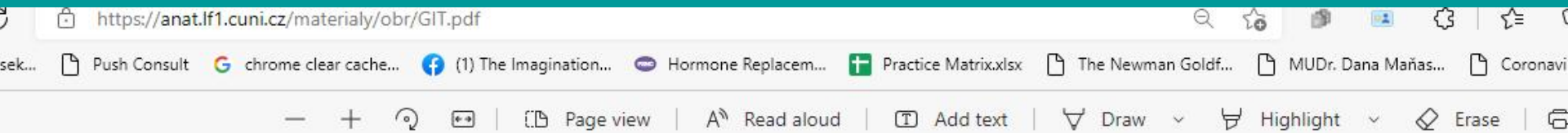
Retroperitoneum

Bránice
Pánev

Peritoneum
Páteř, žebra, svaly

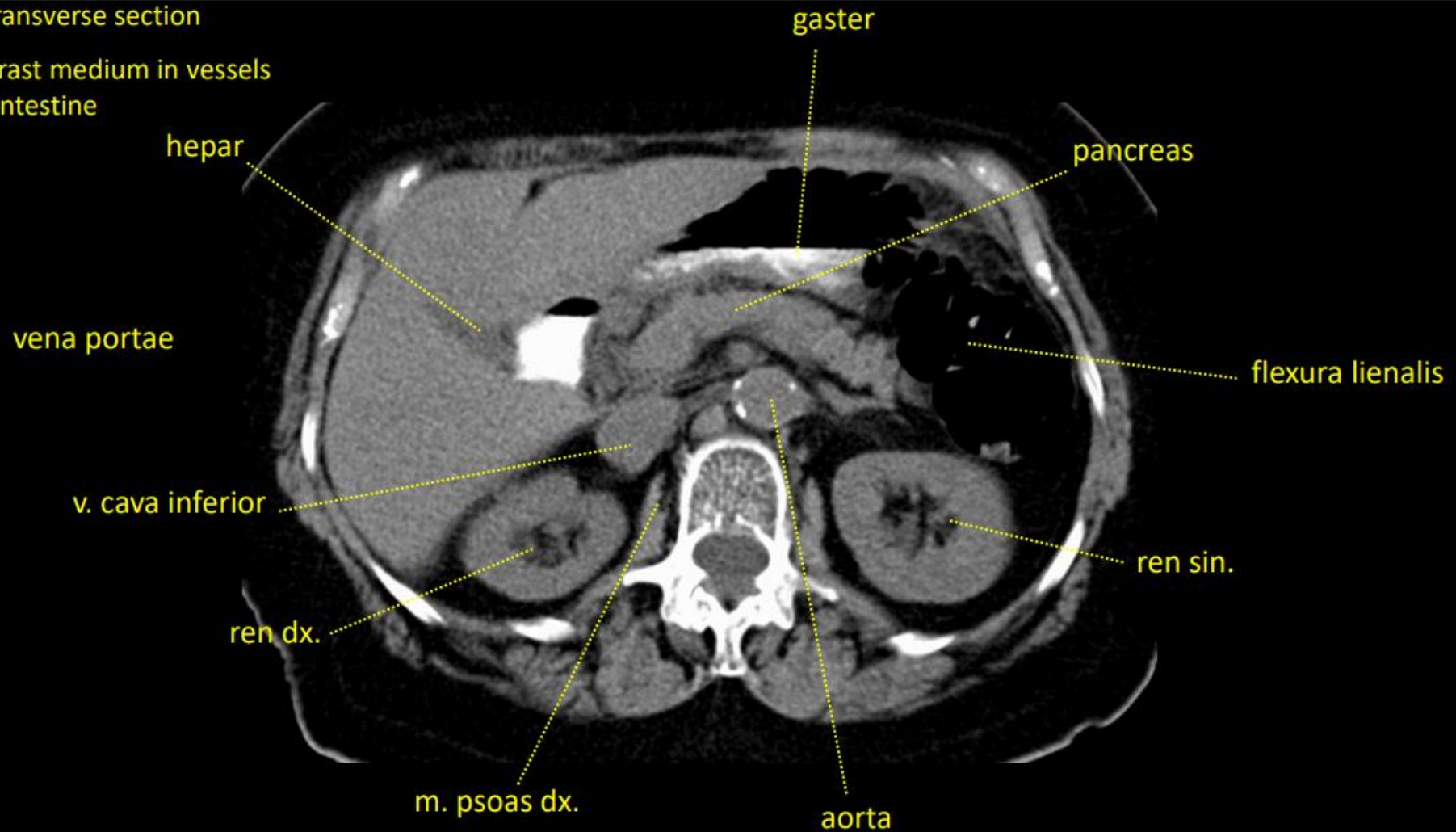


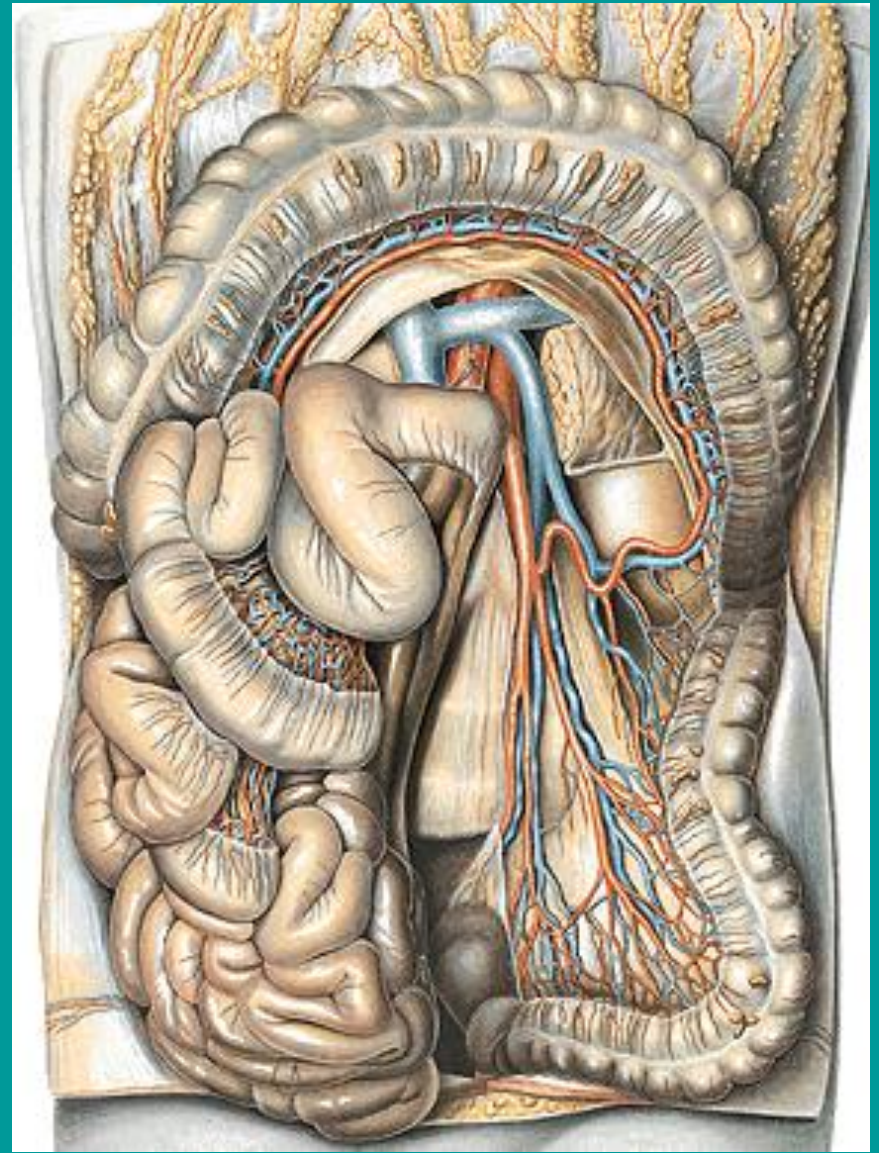
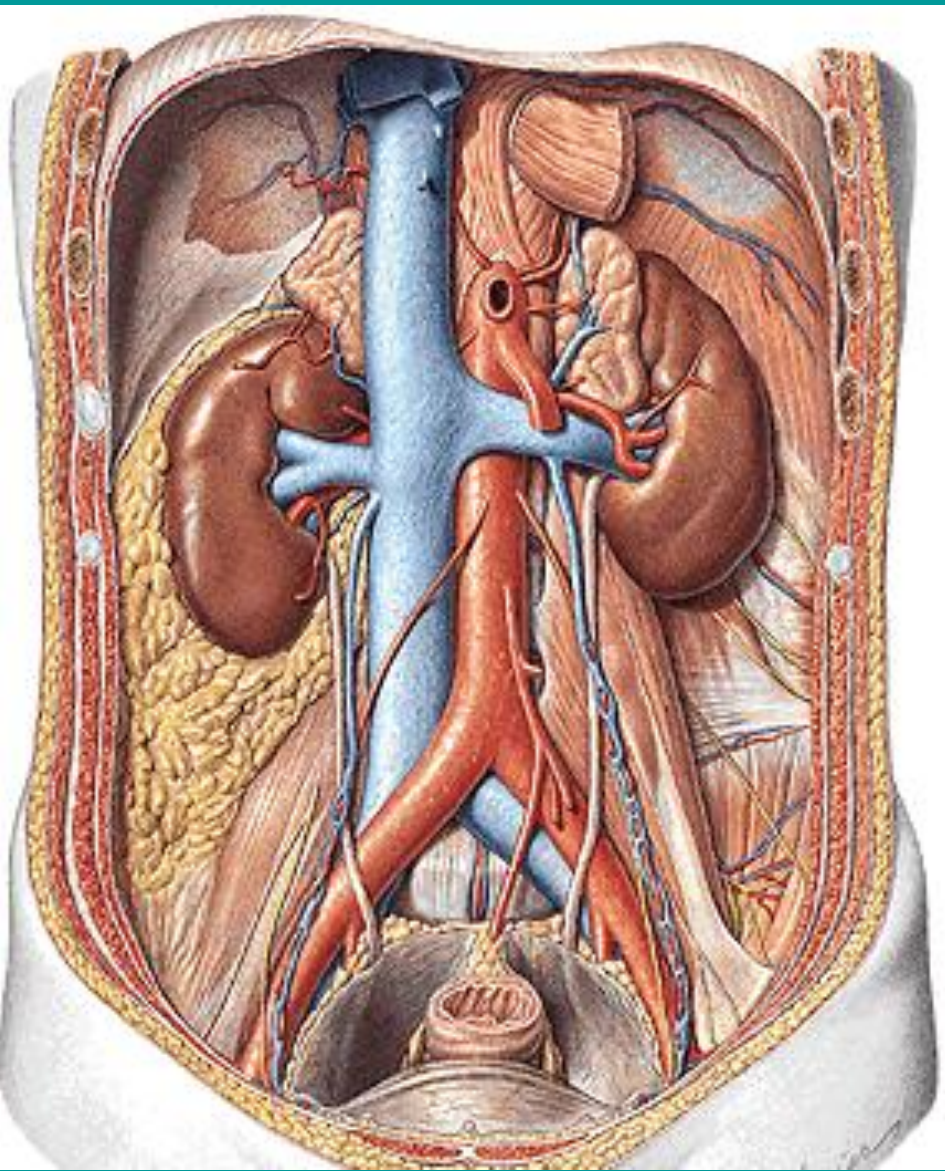
Retroperitoneum



CT, transverse section

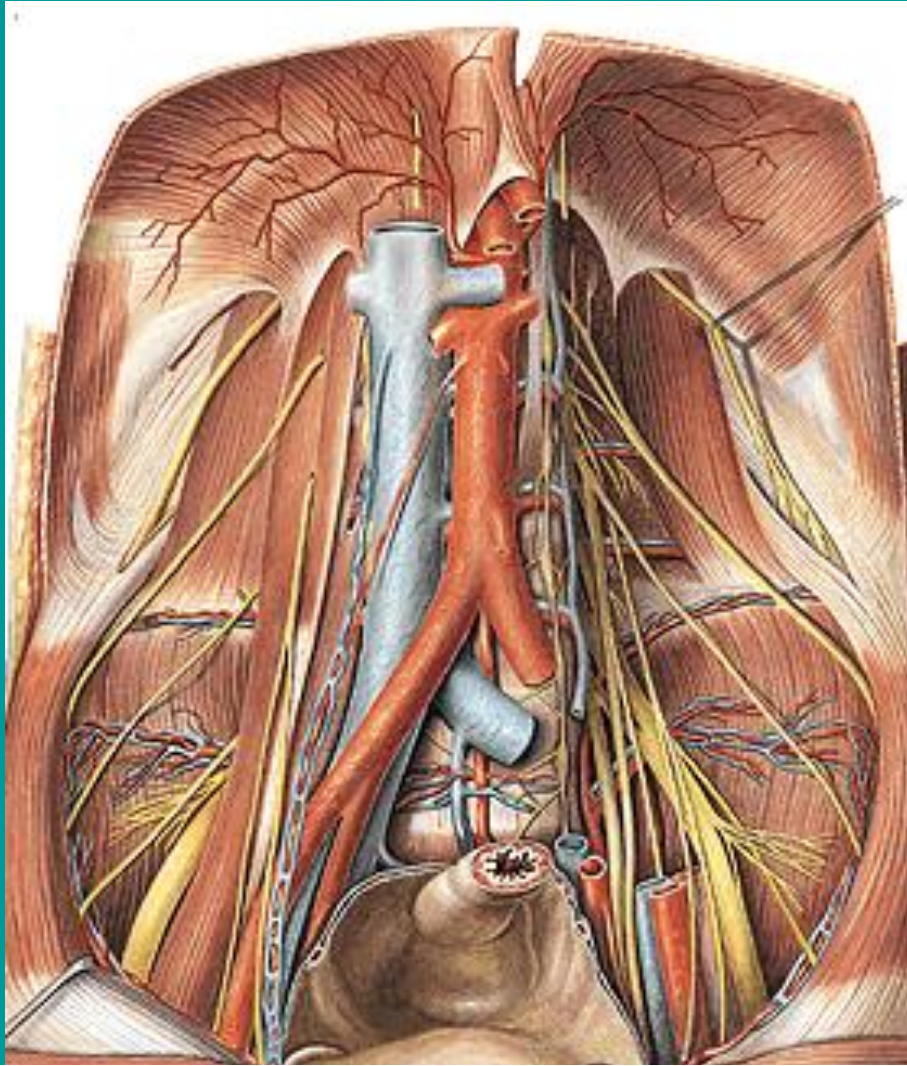
Contrast medium in vessels
and intestine





Vena cava inferior, aorta abdominalis, a. mesenterica inferior
 Portal circulation vs. inferior v. cava

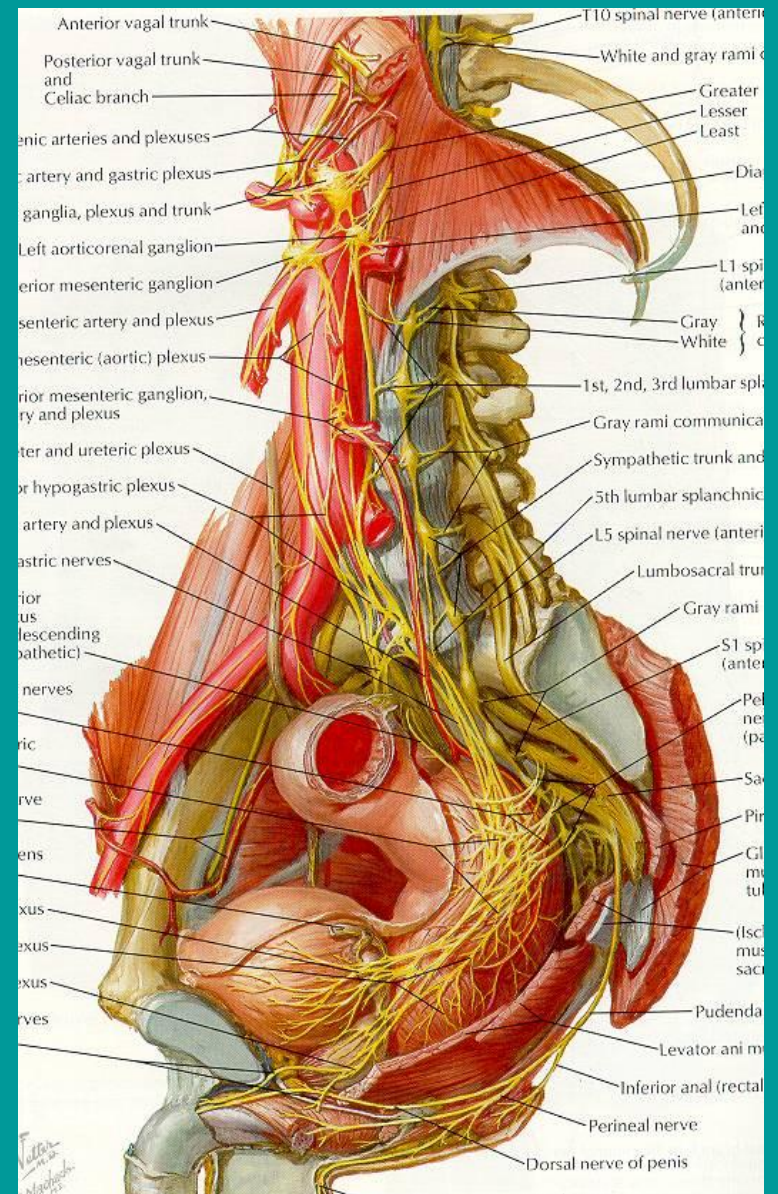
Nerves of retroperitoneal and subperitoneal spaces



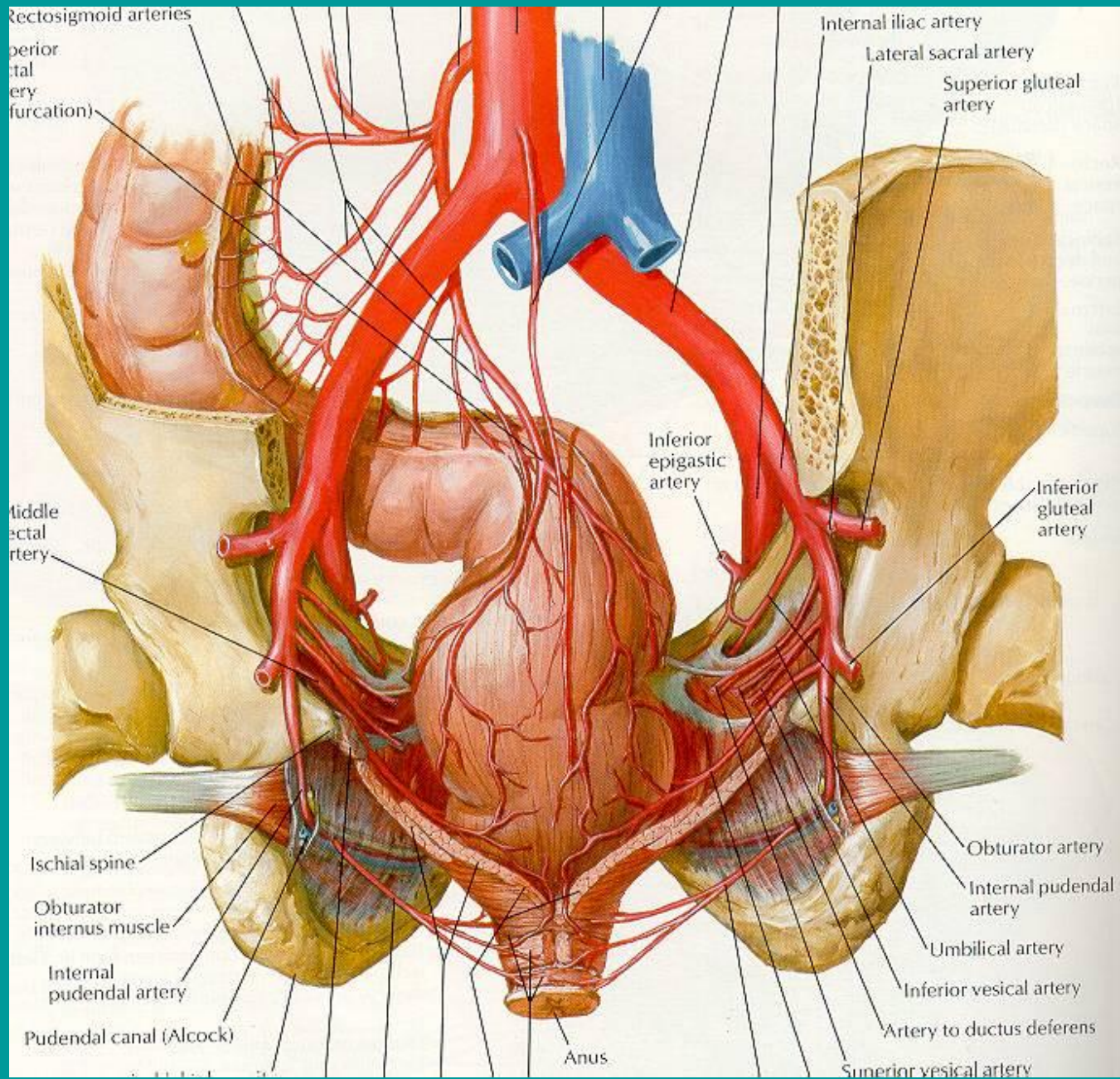
Lumbar and sacral plexuses,
Abdominal and pelvic plexuses and
ganglia of autonomic system



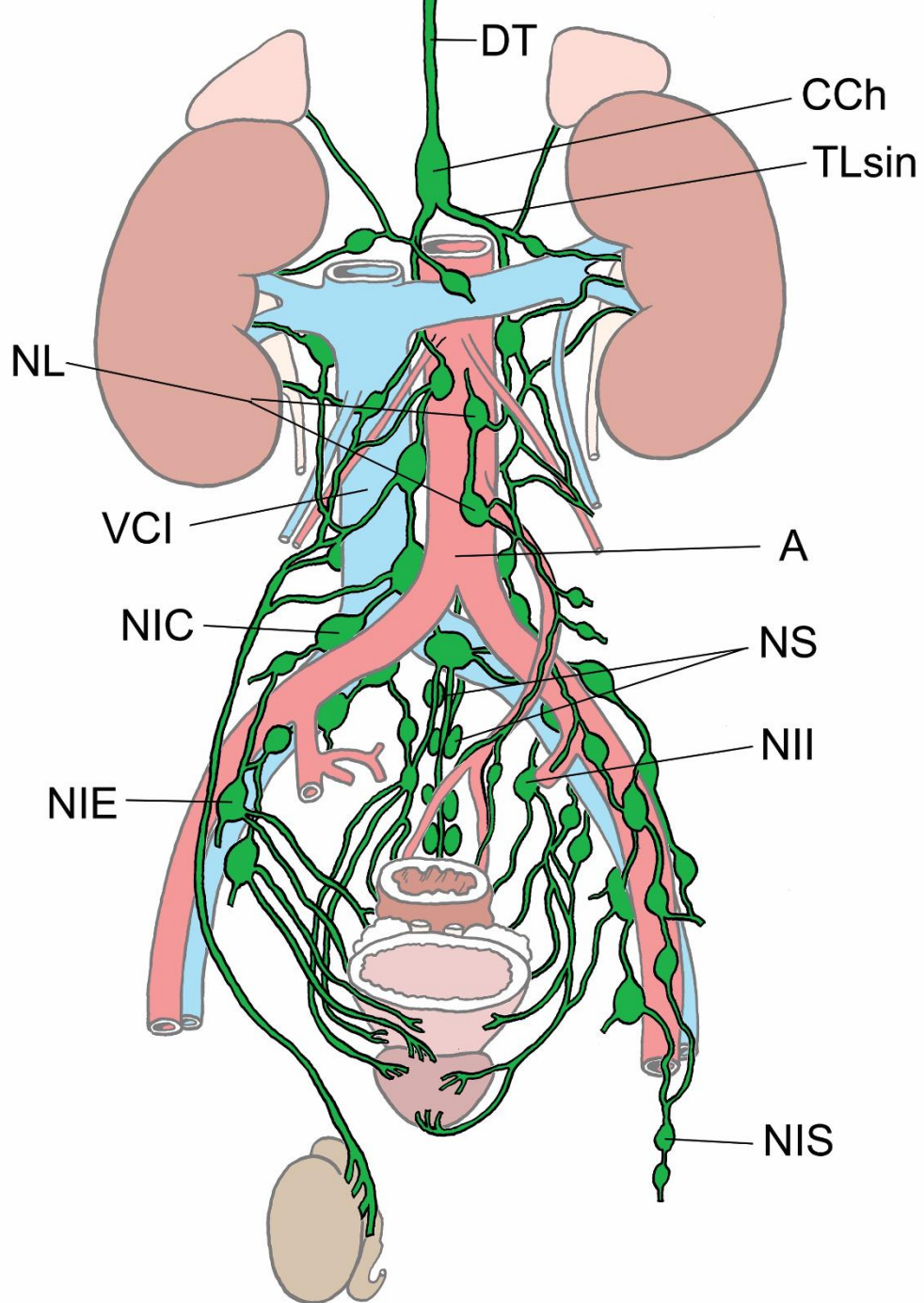
An anatomical model of the human abdominal cavity, viewed from the front. The liver is the large, brown, lobulated organ on the right. The stomach is on the left, with its greater curvature visible. The model shows the major blood vessels: the red superior mesenteric artery and blue superior mesenteric vein, and the red inferior mesenteric artery and blue inferior mesenteric vein. The model is made of a material that looks like wood or plaster, with a yellowish-brown border. The signature "Leprieux" is visible in the bottom right corner.

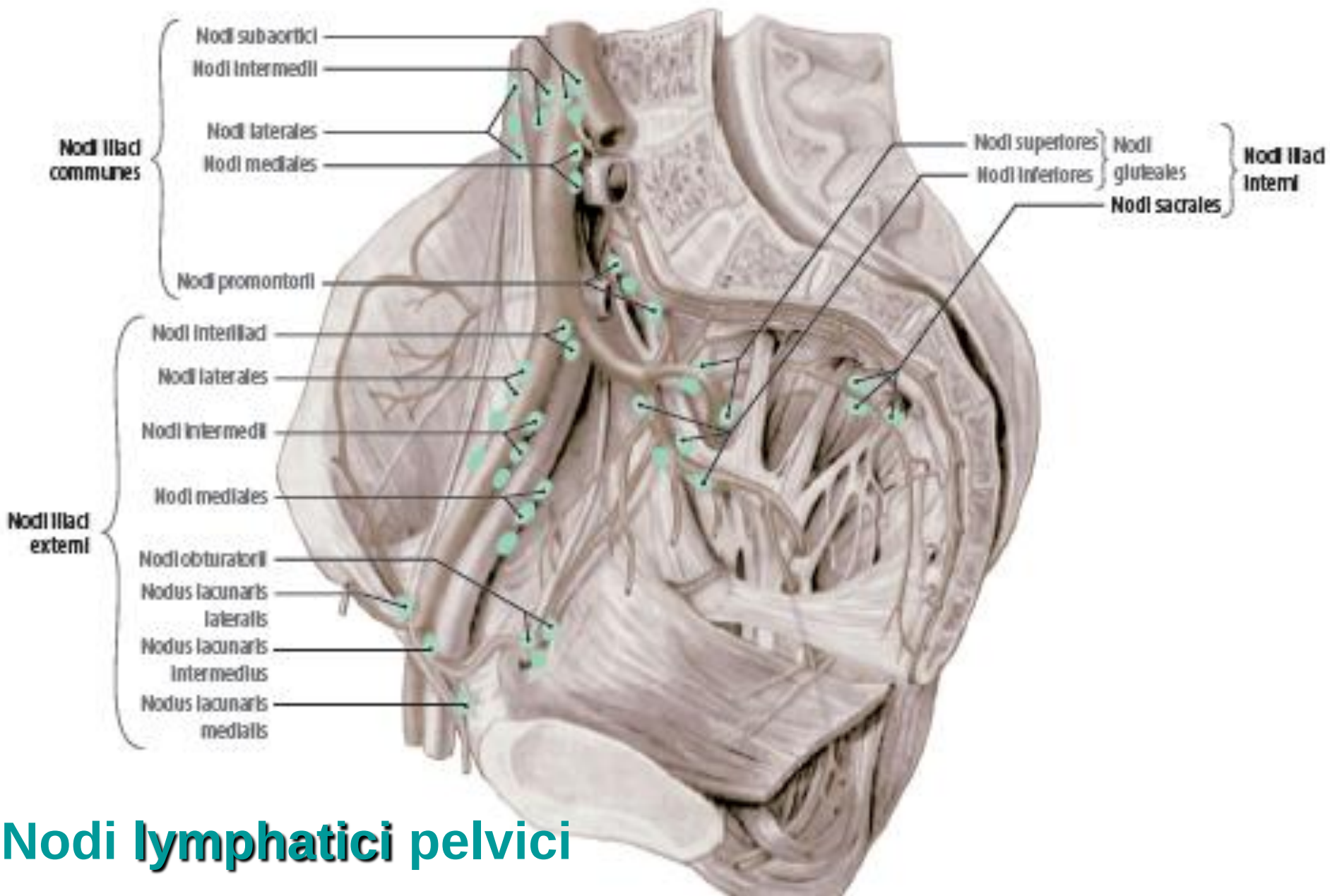


Internal iliac artery, blood vessels of the pelvis



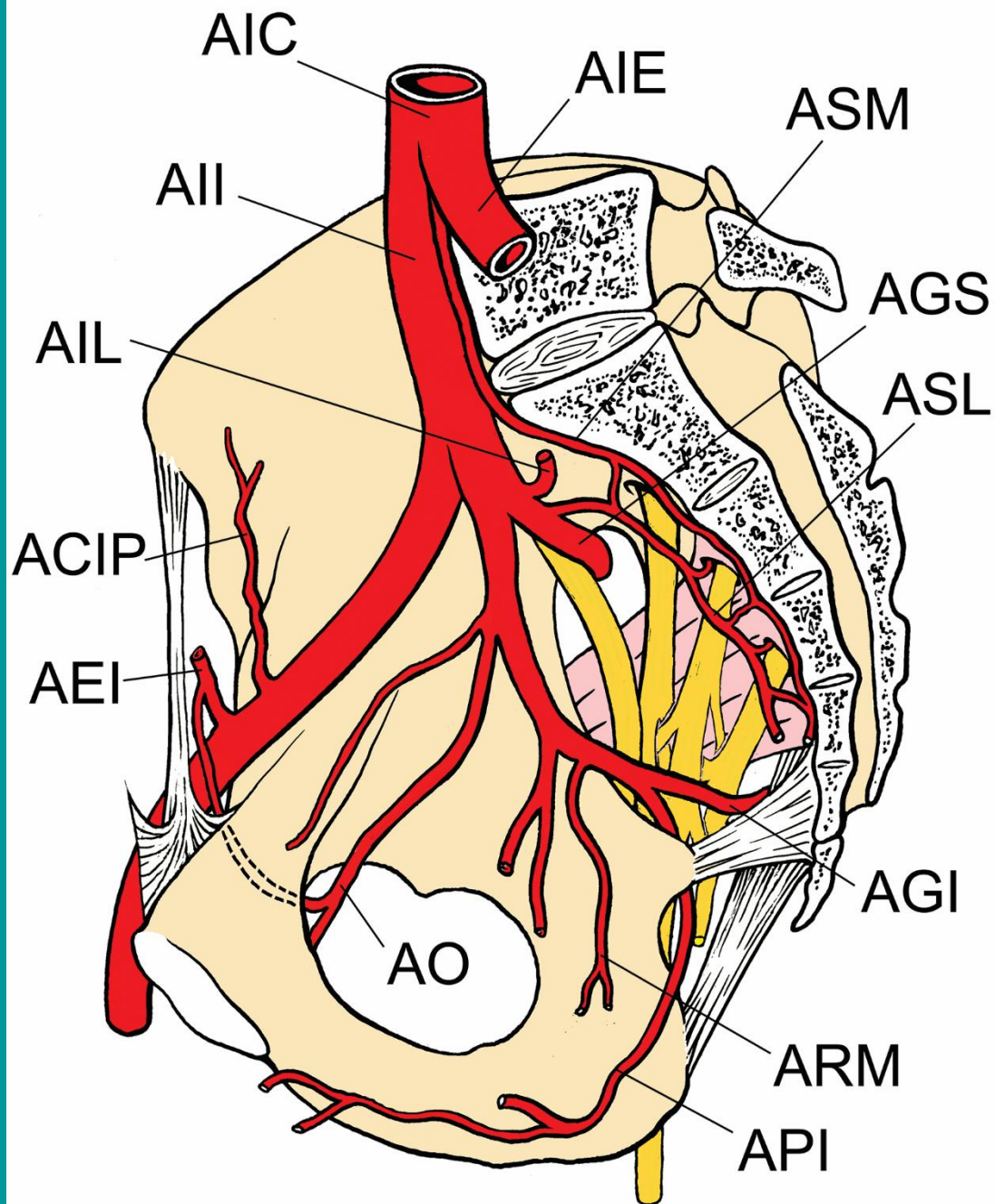
Mízní cévy a uzliny na zadní stěně břišní na stěnách pánve



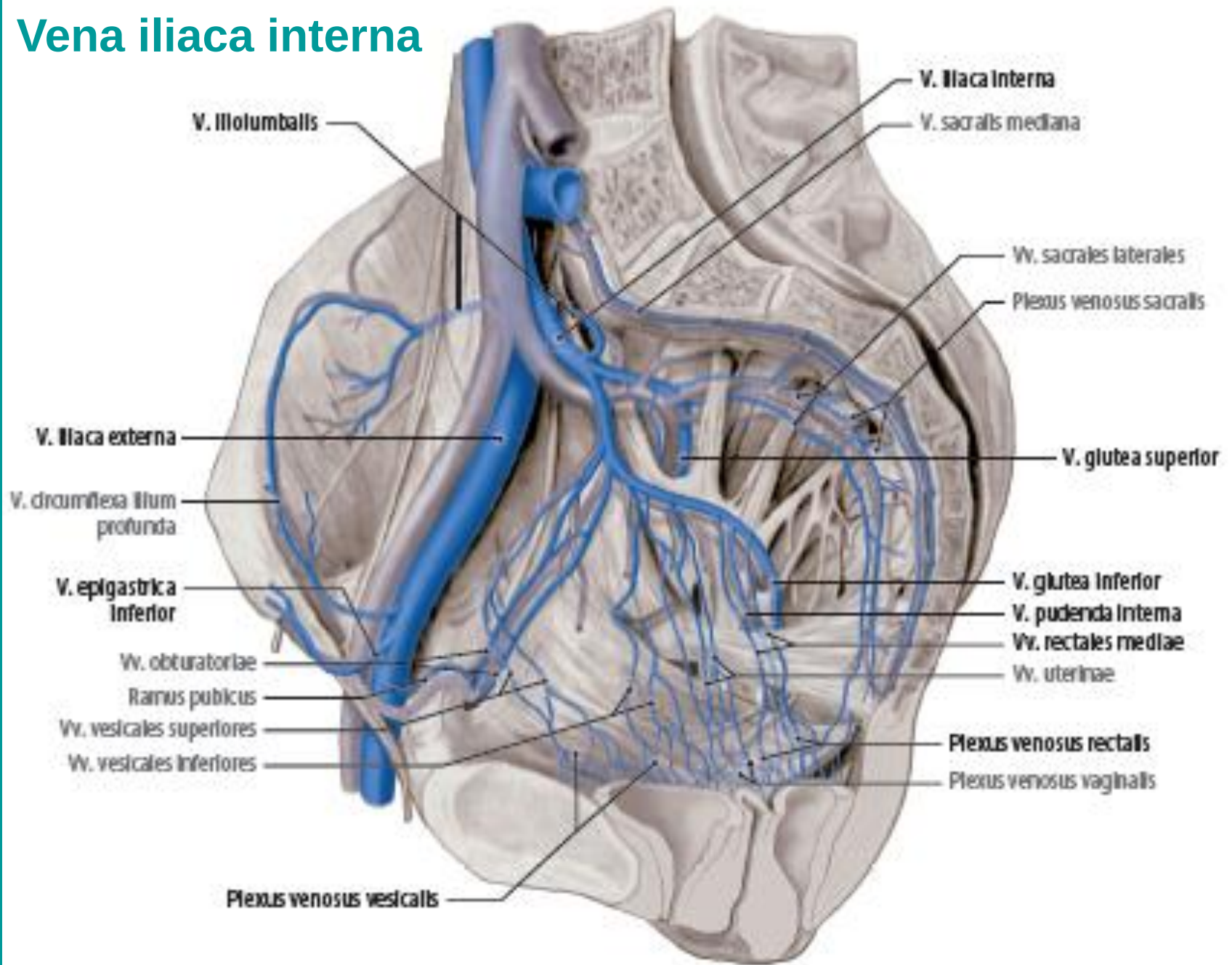


Nodi lymphatici pelvici

Tepny pánve



Vena iliaca interna



Zdroje ilustrací:

Gray's Anatomy,

Sobottův atlas anatomie člověka, Grada, 2007

Grim, Druga: Základy anatomie, 5. díl

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